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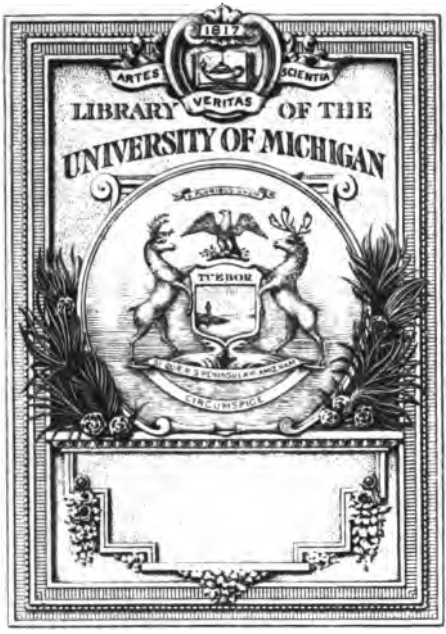
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A TREATISE ON ARITHMETIC,

Collected from the Works of ſeveral Eminent

AUTHORS,

BY

J. BROOKES.

ARITHMETIC, *each Britiſh Youth ſhould Learn,*
As firſt of Arts, and principal Concern;
O'er Truth, and various Arts, its uſe preſides,
And Buſineſs, Traffic, Trade, and Wealth, it guides.

NEWCASTLE:
Printed by *J. SMITH*, and ſold by *T. EVANS*, *Pater-noſter-Row*, LONDON.
M, DCC, LXXVI.

A TREATISE ON ARITHMETIC.

AUTHORS, BY BOOKES.

Hist & sci.
Lyman
8-19-35
30238

PREFACE.

IN the following Pages I have delivered the Rules in as brief and concise a manner as I possibly could, so as to make them general, and in order to render those Rules more easy and familiar, have work'd most of the Examples at full length.

I need not, (I presume) say any thing concerning the utility of, and advantages that accrue to mankind in general from Arithmetic, since they are by this time pretty well known, and also deserve the employment of a much better Pen than mine, but I will venture to say, (and I hope you will pardon me for it) that the Rules laid down in this Book, will upon trial, be found at once sufficient to qualify any Person for Business, which was my greatest inducement for writing it.

I pretend not to boast of new discoveries of my own, neither do I stile my self the Author of this TREATISE, *I can call it no more than a Collection from the Works of Messrs.* SADLER, VYSE, DILWORTH, MAYOH, LEADBETER, FISHER, HILL, SHARP, &c. &c.

In order to make this Book as useful as possible, I have added several Examples of the different Forms of Acquittances, Promissory Notes, Bills *of* Parcels, *and* Book Debts, Foreign *and* Inland Bills *of* Exchange, Letters *of* Credit, *and* Advice, &c. &c. *and as to the order of the Rules in this* TREATISE, *I have placed them as I thought most properly they should be learn'd, but every Master may use his own pleasure, and place the Rules in his own order.*

I should be ungrateful, if I did not own my self obliged to the Gentlemen whose names are expressed above, tho' I have made many alterations by working the Examples different ways and at full length, and to most of the Examples that are borrowed, I have wrote the name of the real Author, as every one will confess that every Author ought to shine in his own Plumes. And in many Questions where I could do it conveniently, I have varied them

them by way of proof, because it not only discovers the reason of the operation, but at the same time both produces a new Question, and proves the old one, and it must be owned that the varying the Question, when it may be done under the same Rule, contributes much towards the understanding of it.

There is likewise (for the further improvement of Youth) added Decimals, Duodecimals, Extraction *of the* Square *and* Cube Roots, *and the use of the Carpenters common* Sliding Rule, *with Proofs by* Gunter's *Line and Dividers.*

I could have swelled this Book to a much greater size, but as the Price of it is fix'd so low, it will not allow it, therefore I hope my worthy Subscribers will be kind enough to excuse it.

I should have been exceeding glad to have seen a much greater attempt of this nature, stampt by the authority of some Person of better abilities, but as no abler hand has undertaken it, I hope its homespun appearance will not lessen its usefulness.

I have nothing more to add, but hope my freedom in mentioning several Authors Names in this Book, (as well as my own and the Printer's errors) will candidly be overlook'd; a Man's failings being so familiar to himself, that he can scarce discern them; therefore the kind admonition of a good natur'd Reader will always be very acceptable.

I am, Gentlemen,

Your most humble, & most obedient Servant,

J. BROOKES.

Explanation of the Characters used in this Book.

Signs Names.	*Signfications.*
+ *Plus or more.*	*The Sign of Addition as* 6+2 *is* 8
— *Minus or less.*	*Sign of Subtraction as* 6—2 *is* 4.
x *Multiply'd into, or by.*	*S. of Multiplication as* 6x2 *is* 12.
÷ *Divide by.*	*Sign of Division as* 6÷2 *is* 3.
= *Equal to.*	*Sign of Equality as* 6+2=8.
: *Is to.* : : *So is.*	*Proportionals as* 2 : 4 :: 6 : 12.
√ *Extraction of the roots.*	*Square root of* 9 *is* $\sqrt{9}=3$ *and the Cube root of* 27 *is* $\sqrt[3]{27}=3$.

6—4 x 9=18, *Signifies that* 6 *less* 4 *multiply'd by* 9 =18.

NUMERATION.

TEACHETH to read or expreſs the true value of any Number, when wrote down; and conſequently to write down any propoſed Number, according to it's true value: and this conſiſteth of two Parts. Firſt, the due order of placing down Figures. Second, the true valuing of each Figure in it's place, both of which are plainly exhibited in the following Table.

Hundreds of Millions.	Tens of Millions.	Millions.	Hundreds of Thouſands.	Tens of Thouſands.	Thouſands.	Hundreds.	Tens.	Units.
1	2	3	4	5	6	7	8	9
9	8	7	6	5	4	3	2	1
	8	7	6	5	4	3	2	1
		7	6	5	4	3	2	1
			6	5	4	3	2	1
				5	4	3	2	1
					4	3	2	1
						3	2	1
							2	1
								1

The uppermoſt line in the Table is read thus, one Hundred twenty three millions, four hundred fifty ſix thouſand, ſeven hundred and eighty nine.

And the next line to that is read thus, nine hundred eighty ſeven millions, ſix hundred fifty four thouſands, three hundred and twenty one. And ſo of any other.

Write down seventeen millions, seventeen thousands, seventeen hundreds and seventeen.

17000000
17000
1700
17

17018717

Write down in words 34167. Begin at the right hand in the place of units, and count them as per Table, and they will be read thirty four thousand, one hundred and sixty seven.

Write in words 909090909. Answer. Nine hundred and nine millions, ninty thousand, nine hundred and nine.

Write in words 63360. Answer. Sixty three thousand three hundred and sixty.

Write down in figures, five hundred twenty five thousand nine hundred and forty eight. Answer. 525948.

ADDITION.

TEACHETH to add sundry numbers together into one Sum, called the total.

RULE.

First place all the numbers of a like name, under one another, that is, units under units, tens under tens, hundreds under hundreds, *&c.*

Second, Begin with the units, and singly collect the sum of each row, and if their sum be less than ten, set it down underneath it's own place; but if it exceeds ten, the excess is only to be set down, carrying one for every ten to the next row, and so on, continuing to the last row, at which set down the total-amount.

6 7 4 8 7 4	7 4 8 6 7 *
5 9 4 8 7 4	5 6 7 4 0
6 7 8 4 0 9	6 7 8 9 4
5 6 7 4 0 8	5 6 7 4 6
6 7 4 0 6 4	6 7 4 0 4
3 1 8 9 6 2 9	3 2 3 6 5 1

* To add the right hand Example, ſay 4 and 6 makes 10 and 4 is 14 and 7 is 21, which is one above two tens, therefore ſet 1 down under the firſt row, and carry 2 to the next, ſaying 2 and 4 is 6 and 9 is 15 and 4 is 19 and 6 is 25, ſet down 5 and carry 2 to the next row; ſaying 2 and 4 is 6 and 7 is 13 and 8 is 21 and 7 is 28 and 8 is 36, ſet down 6 and carry 3 to the next row; ſaying 3 and 7 is 10 and 6 is 16 and 7 is 23 and 6 is 29 and 4 is 33, ſet down 3 and carry 3 to the next row; ſaying 3 and 6 is 9 and 5 is 14 and 6 is 20 and 5 is 25 and 7 is 32, this being the laſt row you muſt ſet down the amount, *(Viz.)* 32, and ſo of any other, ſo the total is 323651.

P R O O F.

Vary the adding by beginning at the top of the ſum, and reckon the figures downwards in the ſame manner you added them upwards, and if the ſum comes the ſame as before it is right.

6 7 4 8 7	8 7 6 5 4
5 7 6 8 4	4 3 2 4 8
6 7 4 9	7 4 8 7
5 7 4 6	6 4 3 7
6 7 9	5 7 8
9 8	4 9
1 3 8 4 4 3	1 4 5 4 5 3
1 3 8 4 4 3	1 4 5 4 5 3

Theſe two Examples are proved by varying the adding, that is, adding them up and down.

£.	£.
4 8 7 4 9	6 7 8 7 4
6 7 4 0 8	4 8 7 4 0
6 4	6 0 0 0 0
5 7 8	5 0 0 0 0
6 4 3 4	4 8 7 0 0
7 8 9 4 6	6 0 0 0 5
6 8	5 6 7 4 6
5 4 9	4 3 9
2 0 2 7 9 6	3 9 2 5 0 4
1 5 4 0 4 7	3 2 4 6 3 0
2 0 2 7 9 6	3 9 2 5 0 4

These two Examples are prov'd by leaving the top line out the second time over, and then adding the bottom and and top together, and if their sum agree with the total, the work is right.

I was born in the Year 1746, when shall I be 64 Years of age.

1746	Year of our Lord.
64	Years of age.
1810	Answer.

A Gentleman had in his nursery one million Oak, one hundred thousand Ash, one hundred Fruit trees, and fifty nine Elm and Lime trees, I demand how many trees were growing in the nursery.

Oaks	1000000	
Ash	100000	
Fruit	100	
Elm &c.	59	
Answer	1100159	Trees in all.

* In

* In seventeen hundred sixty and five,
A Lady was born who I hope's now alive;
To be twenty Years, I'd have her no more,
But join her in bands, at the age of one Score;
Then tell me Tyro what Year this will be,
'Twill pleaſe th' dear Charmer, no doubt, and pleaſe thee.

1765 Year of our Lord.
20 Years of age.

Anſwer 1785 The Year required.

A Tree being cut into four parts, each part being meaſured contained 20, 25, 30, and 37 ſolid Feet: what was the contents of the whole Tree.

Parts { 20, 25, 30, 37 } Feet.

Anſwer. 112 Solid Feet.

A Gentleman being upon his Travels, rode through ſix Market Towns, A, B, C, D, E, F, in one day, ſetting out of the Town A, and lying in the Town F, all night, found the diſtance from A, to B, 17 miles, from B, to C, 10, from C, to D, 16, from D, to E, 7, and from E, to F, 8 miles: I demand the miles travelled by the Gentleman that day.

From	A,	to	B, 17 Miles.
	B,		C, 10 ditto.
	C,		D, 16 ditto.
	D,		E, 7 ditto.
	E,		F, 8 ditto.

58 Miles.

* *See* SADLER's *Arithmetic.*

Compound *ADDITION.*

TEACHETH to add ſundry ſums or numbers together, having divers denominations, as in Money, Weights, Meaſures, *&c.*

RULE,

Place the numbers of a like denomination under each other, *(Viz.)* Pounds under Pounds. Shillings under Shillings, Pence under Pence, Farthings under Farthings, *&c.*

Begin to add at the loweſt denomination firſt, as in Integers, then divide that ſum by as many of the ſame denomination as makes one of the next greater, ſetting down the remainder under the row added, and carry the Quotient to the next ſuperior or greater denomination, whoſe ſum you muſt alſo find; proceed in this manner to the laſt (or greateſt denomination) which add as in Integers.

PENCE TABLE.

Pence.		*s.*	*d.*	*Pence.*		*Shil.*
20		1	8	24		2
30		2	6	36		3
40		3	4	48		4
50		4	2	60		5
60		5	0	72		6
70	is	5	10	84	is	7
80		6	8	96		8
90		7	6	108		9
100		8	4	120		10
110		9	2	132		11
120		10	0	144		12

This Table to be learn'd perfectly by heart before we proceed to work any Examples. In a Pound Stirling are 960 Farthings, 240 Pence, 80 three-pence's, 60 Groats.

l.	*s.*	*d.*
674	18	6
596	14	8
729	17	11
462	15	4
679	18	6
549	14	8
3693	19	7
3693	19	7

	l.	*s.*	*d.*	*q.*
*	748	17	6	$\frac{1}{4}$
	674	18	8	$\frac{3}{4}$
	478	14	6	$\frac{1}{2}$
	674	19	8	$\frac{1}{4}$
	468	17	4	$\frac{3}{4}$
	724	15	8	$\frac{1}{4}$
	3771	3	6	$\frac{3}{4}$
	3771	3	6	$\frac{3}{4}$

* To add up the right hand Example, ſay, 1 and 3 is 4 and 1 is 5 and 2 is 7 and 3 is 10 and 1 is 11, which is 11 Farthings, and make 2*d.* $\frac{3}{4}$*q.* then ſet $\frac{3}{4}$*q.* down under the Farthing row, and carry 2 to the pence row, ſaying, 2 and 8 is 10 and 4 is 14 and 8 is 22 and 6 28 and 8 is 36 and 6 is 42 Pence, which is 3*s.* 6*d.* ſet 6*d.* down under the Pence row, and carry 3 to the Shillings, ſaying, 3 and 5 is 8 and 7 is 15 and 9 is 24 and 4 is 28 and 8 is 36 and 7 is 43, then come down the left hand row by tens, ſaying, 43 and 10 is 53 and 10 is 63 and 10 is 73 and 10 is 83 and 10 is 93 and 10 is 103 Shillings, which is 5*l.* 3*s.* ſet the 3*s.* under the Shillings row, and carry 5 to the next row, ſaying, 5 and 4 is 9 and 8 is 17 and 4 is 21 and 8 is 29 and 4 is 33 and 8 is 41, ſet down 1 and carry 4 to the next row, and proceed as in *Simple Addition.*

l.	*s.*	*d.*	*q.*
74	18	6	$\frac{1}{4}$
6	0	8	
79	14	0	$\frac{1}{2}$
6	0	0	$\frac{3}{4}$
49	18	11	$\frac{1}{4}$
29	17	8	$\frac{3}{4}$
64	0	0	$\frac{1}{4}$
9	16	0	$\frac{3}{4}$
320	6	0	$\frac{1}{2}$

l.	*s.*	*d.*	*q.*
486	18	6	$\frac{1}{4}$
674	15	8	$\frac{1}{2}$
587	14	9	$\frac{1}{4}$
67	19	8	$\frac{1}{2}$
49	15	6	$\frac{1}{4}$
64	18	10	$\frac{3}{4}$
9	17	11	$\frac{1}{4}$
9	14	0	$\frac{1}{4}$
1951	15	1	

N. B. The two firſt ſums are prov'd by varying the adding, that is adding them both ways: I have only ſet the total down of the two laſt, as it is needleſs to proceed further, an Example or two being ſufficient for proof.

Bought by a Country Shopkeeper, *viz.*	*l.*	*s.*	*d.*	*q.*
Linen Cloth, to the Value of	31	9	2	¼
Sugar,	6	14	6	¼
Tobacco's.	10	18	4	¾
Woollen Cloth and *Stuffs*.	40	14	6	¼
Fruit.	12	18	2	½
Brandy and *Waters*.	7	12	11	¼
£.	110	7	9	¼

Sold by a *HOSIER*.	*l.*	*s.*	*d.*	*q.*
4 *pr.* of Silk Stockings,	2	12	6	
7 *pr.* of Worsted ditto,	2	13	4	¼
9 *pr.* of Thread Hose,	0	17	6	
12 *pr.* of Childrens,	1	6	8	¼
6 *pr.* of mill'd Hose,	2	18	9	¾
3 *Yrds.* of Flannel,	0	3	6	
£.	10	12	4	¼

A *Brewer's* Clerk receives of several Persons as follows, *viz.*

	l.	*s.*	*d.*	*q.*
Lawrence Lick Spigot,	3	14	6	¼
Frank Froth,	4	19	8	¼
Saul Swigg,	5	15	5	¾
Ben. Bumper,	3	3	6	
Henry Hearty,	5	16	8	¼
Stephen Stout,	4	14	6	
£.	28	4	4	½

A *Collector* of the *Excise* receives in	*l.*	*s.*	*d.*
Suffex,	160	17	8
Kent.	7220	14	6
Surry,	5970	15	8
Hampshire,	4670	16	7
Hertfordshire,	724	18	6
Bucks.	690	17	2
£.	19439	0	1

Bought

Bought of *George Mercer*, *5th Nov.* 1774.	*l.*	*s.*	*d.*	*q.*
9 *Yards* of Silk,	5	10	6	¼
12 *Yards* of flower'd Silk,	12	18	1	¾
16 *Yards* of Sarcenet,	4	16	6	¼
10 *Yards* of Sattin,	10	14	8	¼
16 Silk Handkerchiefs,	2	11	6	
24 *Yards* of Ribbon,	0	12	10	
15 *Yards* of Brocade,	7	6	9	½
14 *Yards* of *Genoa* Velvet,	14	18	4	
12 *Yards* of Luſtring,	2	0	6	
11 Scarves,	1	0	0	
	62	9	9	¾

A Merchant upon the balancing of his Books, finds he has in Money, Debts, and Goods. *viz.*

	l.	*s.*	*d.*	*q.*
In Caſh,	1000	16	4	
In Cambricks,	70	14	8	
In Tobacco's,	60	18	8	
By *Henry Harper* owing,	50	0	0	
In Sugar,	60	0	8	
In Serges,	300	0	10	
By Voyage to *Liſbon*	96	0	5	
In Indigo,	54	15	0	¾
By *William Waxham*,	68	17	0	¼
In Cochineal,	900	18	7	¼
By the *Ship Roſe*,	69	11	0	
In Canary Wine,	49	0	0	
In Red Port,	70	0	0	
In White ditto,	69	17	6	¼
In Madeira,	48	15	4	¼
By Voyage to *Canada*,	67	0	8	
In Ivory,	58	19	6	
£.	3096	6	3	¾

Admit a Man hath owing him, by *A*, 182*l*. 17*s*. 11*d*. $\frac{3}{4}$, by *B*, 15 Groats, by *C*, 86*l*. 10*s*. by *D*, 21*s*. by *E*, 2*l*. 17*s*. 6*d*. by *F*, a Moidore, by *G*, 100*l*. 10*s*. 6*d*. by *H*, an Angel, by *I*, 6*l*. 17*s*. 6*d*. by *K*. a Mark, by *L*, 99*l*. 18*s*. 6*d*. by *M*, 18*s*, by *N*, 72*l*. 6*s*. 3*d*. $\frac{3}{4}$, by *O*, 18*d*. $\frac{3}{4}$, by *P*, 170*l*. 15*s*. 6*d*. $\frac{1}{4}$, how much hath he owing him in all.

	l.	*s.*	*d.*	*q.*
A.	182	17	11	$\frac{3}{4}$
B.	0	5	0	
C.	86	10	0	
D.	1	1	0	
E.	2	17	6	
F.	1	7	0	
G.	100	10	6	
H.	0	10	0	
I.	6	17	6	
K.	0	13	4	
L.	99	18	6	
M.	0	18	0	
N.	72	6	3	$\frac{3}{4}$
O.	0	1	6	$\frac{3}{4}$
P.	170	15	6	$\frac{1}{4}$
£.	727	9	8	$\frac{1}{2}$

A Perſon dying left his Widow the uſe of 99*l*. to a Charity he bequeathed 832*l*. 11*s*. to each of his three Nephews 1220*l*. to each of his four Nieces 1032*l*. to twenty poor Houſekeepers 3 Guineas each, and 200 Guineas to his Executor. What muſt he have died poſſeſſed of.

	l.	*d.*	*d.*
To the Widow,	99	0	0
To the Charity,	832	11	0
To his three Nephews,	3660	0	0
To his four Nieces,	4128	0	0
To 20 poor Houſekeepers,	63	0	0
To his Executor.	210	0	0
£.	8992	11	0

The

The Collector of Cash has been out with Bills, and gives account that *A*, paid him 12*l*. 2*s*. 6*d*. *B*, 1*l*. 13*s*. 6*d*. *C*, 15*s*. 6*d*. *D*, 1*l*. 10*s*. 0*d*. ½. *E*, 12*l*. 0*s*. 10*d*. *F*, 17*s*. and a Tester, *G*, 12*s*. 0*d*. ¼. *H*, 2*l*. 12*s*. 6*d*. *I*, a Moidore and 13*s*. *K*, two broad pieces of 23*s*. each, a Jacobus of 25*s*. and a Shilling, *L*, 9*l*. and a Mark, *M*, 12 Guineas, *N*, a Bank Note of 15*l*. What Cash has he in charge.

	l.	*s*.	*d*.	
A,	12	2	6	
B,	1	13	6	
C,	0	15	6	
D,	1	10	0	½
E,	12	0	10	
F,	0	17	6	
G,	0	12	0	¼
H,	2	12	6	
I,	2	0	0	
K,	3	12	0	
L,	9	13	4	
M,	12	12	0	
N,	15	0	0	
£.	75	1	8	¾

A Gentleman gave orders to an Auctioneer, to sell him the following Farms or Tenements. What is the sum total of their Yearly Rent.

	l.	*s*.	*d*.
Benjamin Blake,	20	10	0
John Johnson,	30	0	0
James Jenks,	15	15	6
Ralph Ridgway,	60	14	0
Jonathan Ireton,	20	0	0
William Podmore,	10	10	0
John Jacobs,	3	18	4
Godfrey Henshall,	7	16	0
Stephen Stout,	8	15	9
Joseph Richards,	15	17	0
	193	16	7

An Aſſeſſment for the Highway Levy, or Ley, in the Townſhip of *N*, and Pariſh of *M*, in the County of *Cheſter*, rated at 3*d*. *per Pound*, from *Michaelmas* 1773, to *Michaelmas* 1774.

Sir *Ambroſe Longbutts*, Bart.	2	12	6		
Sampſon Gripe Eſq;	1	15	8		
Iſaac Tarratt, ——	1	10	4		
Samuel Bentley, ——	2	4	8	¼	
William Swift, ——	1	6	3		
James Brown, ——	2	8	4		
Samuel Seaman, ——	1	6	2		
Peter Johnſon, ——	2	4	8		
Ralph Broſter, ——	3	8	8		
James Jones, ——	2	0	0		
Kendrick Keepſtouch, —	1	6	3		
Patrick O'Cavannah, —	2	12	6		
Nathan Needy, ——	1	11	4	½	
Thomas Swettenham, —	2	6	6		
£.	28	13	10	¾	

A, of ~~*Amſterdam* is **Debtor**~~ to *B*, of *Briſtol*.	*l.*	*s.*	*d.*
For Mercery Wares as *per* Factory,	500	14	6
For 40*C*. weight of *Cheſhire* Cheeſe,	60	17	8
For *Engliſh* broad Cloth, 15 Pieces,	97	15	8
For 19 Fodder of Lead, ——	88	19	6
For 12 Tons of bar Iron, ——	672	18	4
For 8 Tons of Copper, ——	430	19	8
For his acceptance of a Bill drawn,	60	0	0
For another paid for honor, ——	57	4	6
For 10 Dozen Morocco Skins, ——	70	18	6
Paid Convoys, Inſurance, and Port charges,	40	14	2
Warehouſe room, Poſtage, Sledage, Boatage, and Incidental charges, ——	5	16	4
The Factorage of all, came to ——	98	14	8
£.	2185	13	6

Avoirdupois

Avoirdupois *WEIGHT.*

16 Drams		1 Ounce		oz.
16 Ounces		1 Pound		lb.
28 Pounds	is	1 Quarter	mark'd	qr.
4 Quarters		1 Hundred		C.
20 Hundreds		1 Ton		Ton.

In one Ton are 573440 Drams, 35840 Ounces, 2240 Pounds, and 80 Quarters.

Grocery and *Chandlers* Ware, and all *Metals*, except *Gold* and *Silver*, are weighed by this weight: according to Mr. *Malcolm*, Sheeps wool hath these denominations, 7 Pounds = 1 Clove, 2 Cloves = 1 Stone = 14 Pounds, (but in *Scotland* and many places in *England*, 16 Pounds are reckoned to the Stone,) 2 Stones = 1 Tod, $6\frac{2}{5}$ Tods = 1 Wey, 2 Weys = 1 Sack, 12 Sacks 1 Laſt. *(Sadler.)*

N. B. In all Queſtions that may occur either in weight or Meaſure, you muſt point or dot, according to the Table pertaining to ſuch Weight or Meaſure.

A Country Shopkeeper bought of a Tradeſman in *London*, Sugars weighing 4*C.* 3*qr.* 9*lb.* Raiſins 2*C.* 1*qr.* 21*lb.* Teas 1*C.* 3*qr.* Coffee 3*qr.* 19*lb.* Spices 1*C.* 0*qr.* 12*lb.* What was the whole weight.

	C.	*qr.*	*lb.*
Sugars,	4	3	9
Raiſins,	2	1	21
Teas.	1	3	0
Coffee,	0	3	19
Spices,	1	0	12
Anſwer	11	0	5

N. B. The Quarters are to be caſt up as though they were Farthings.

A

A Stocking Weaver bought 6 Bales of Silk containing

(*VIZ.*)		*lb.*	*oz.*	*dr.*
No. 1.		5	10	12
2.		2	8	14
3.		3	4	15
4.		6	14	12
5.		5	15	8
6.		1	2	3
	Anſwer.	25	9	0

TROY *WEIGHT.*

By this weight are weighed Jewels, Gold, Silver, Corn, Bread, and Liquors.

24 Grains		1 Penny wt.		dwts.
20 Penny wts.	is	1 Ounce	mark'd	oz.
12 Ounces		1 Pound		lb.

In a Pound Troy are 5760 Grains, 240 Penny weights, and 12 Ounces.

Mr. WARD (in his young Mathematicians Guide) cites a Statute of EDWARD III. by which there ought to be no Weight but Troy, "but Cuſtom (ſays he) afterwards "prevailed in giving larger weight to courſe and droſſy "commodities, and thereby introduced the weight called "Avoirdupois, and the proportion between Troy, and "Avoirdupois weight he ſays, that one Pound Avoirdu-"pois is equal to 14*oz.* 11*dwts.* 15 ½ Grains Troy." So neither the Ounce nor the Pound are the ſame.

Write

lb.	(12) *oz.*	(20) *dwt.*	(24) *gr.*
20	10	18	23
37	11	16	18
49	8	14	12
67	0	16	17
59	11	14	0
64	8	18	19
300	4	19	17

Write down the weight of each Quantity, under each other, and add them up as in *Addition* of Money, only take care to carry according to this Table, or as you see Expressed at the top of each denomination in this Example.

For proof proceed the same as in *Addition* of Money.

A Lady of fortune being desirous of furnishing herself with household Plate, went to a Silversmith and bought Dishes to the weight of 20*lb.* 10*oz.* 18*dwt.* 21*gr.* Plates 37*lb.* 0*oz.* 19*dwt.* 14*gr.* Spoons 8*lb.* 9*oz.* 4*dwt.* Salts 3*lb.* 0*oz.* 15*dwt.* 19*gr.* a Tankard and Cup 5*lb.* 11*oz.* 14*dwt.* and also three Waiters 12*lb.* 0*oz.* 0*dwt.* 23*gr.* What weight of Plate did she buy in all.

	lb.	(12) *oz.*	(20) *dwt.*	(24) *gr.*
Dishes, ——	20	10	18	21
Plates, ——	37	0	19	14
Spoons, ——	8	9	4	0
Salts, ——	3	0	15	19
Tankard and Cup,	5	11	14	0
Waiter, ——	12	0	0	23
Answer.	87	9	13	5

N. B. You may work this Example, and all others of the kind as usual, (except at the Grains,) for the Penny weights, are to be worked the same as Shillings, the Ounces as Pence, and the Pounds as Integers.

Apothecaries

Apothecaries *WEIGHT.*

20 Grains		1 Scruple		*Scr.*
3 Scruples	is	1 Dram	mark'd	*dr.*
8 Drams		1 Ounce		*oz.*
12 Ounces		1 Pound		*lb.*

Apothecaries weight is the same as Troy, and is so called because the Apothecaries, Druggist, &c. compound their Medicines by it, but they buy and sell by Avoirdupois weight.

lb.	*oz.*	*dr.*	*scr.*	*gr.*
10	11	6	2	18
16	10	5	1	14
18	8	2	2	17
14	7	7	1	16
16	8	4	2	14
19	9	6	1	15
97	8	7	1	14

N. B. The Grains are cast up as Shillings, and the Ounces as Pence.

An Apothecary made a Composition of 6 ingredients, the weight of the *1st.* was 12*lb.* 6*oz.* 4*dr.* 1*scr.* 13*gr.* the *2d.* 8*lb.* 4*oz.* 5*dr.* 2*scr.* 14*gr.* the *3d.* 9*lb.* 1*scr.* 16*gr.* the *4th.* 14*lb.* 3*oz.* 1*dr.* the *5th.* 6*lb.* 11*oz.* 4*dr.* 2*scr.* 17*gr.* and the *6th.* 11*lb.* 2*scr.* 5*gr.* What was the weight of the whole.

		(12)	(8)	(3)	(20)	
		lb.	*oz.*	*dr.*	*scr.*	*gr.*
No.	1.	12	6	4	1	13
	2.	8	4	5	2	14
	3.	9	0	0	1	16
	4.	14	3	1	0	0
	5.	6	11	4	2	17
	6.	11	0	0	2	5
		62	2	1	2	5

Long

LONG *MEASURE*.

3 Barley Corns		1 Inch	In
12 Inches		1 Foot	F.
3 Feet		1 Yard	Yd.
5½ Yards	is	1 Rod Pole &c.	mark'd R.
40 Poles		1 Furlong	Fur.
8 Furlongs		1 Mile	M.
3 Miles		1 League	L.
69½ Miles		1 Degree	Deg.

In a Mile are 190080 Barley Corns, 63360 Inches, 5280 Feet, 1760 Yards, and 320 Poles or Perches.

In Long Meafure (according to the *Statutes* of 33 EDWARD I. and 25 ELIZABETH,) a Barley Corn is the leaft meafure, whereof 3 taken out of the middle of an ear of Corn and well dried are an Inch, 4 Inches = 1 Hand, 6 Feet = 1 Fathom, 3 Miles = 1 League, 60 Geographical Miles = 1 Degree, or Mr. *Norwood's* meafure 69½ Miles make 1 Degree, = 25020 Miles the Circumferance of the Earth: or *per* Geographical Meafure = 21600 Miles.

A Turnpike Surveyor meafures upon the road from *A*, to *B*, 6 Miles 4 Furlongs 15 Poles, from *B*, to *C*, 4 Miles 7 Furlongs 30 Poles, from *C*, to *D*, 10 Miles 20 Poles, *D*, to *E*, 9 Miles 6 Furlongs 12 Poles, and from *E*, to *F*, 12 Miles 2 Furlongs 15 Poles. What is the diftance between *A*, and *F*.

			(8)	(40)
			M.	*Fur.*	*Pls.*
From *A*	to	*B.*	6	4	15
B.		*C.*	4	7	30
C.		*D.*	10	0	20
D.		*E.*	9	6	12
E.		*F.*	12	2	15
			43	5	12

To

To add the preceding Example I ſay, 5 and 2 is 7 and 5 is 12, ſet down 2 aud carry 1, and ſay 1 and 1 is 2 and 1 is 3 and 2 is 5 and 3 is 8 and 1 is 9, which makes 92 Poles, and is 2 Furlongs and 12 Poles, ſet 12 down and carry two to the next row, ſaying, 2 and 2 is 4 and 6 is 10 and 7 is 17 and 4 is 21 Furlongs, which is 2 Miles and 5 Furlongs, ſet 5 down, and carry 2, ſaying, 2 and 12 is 14 and 9 is 23 and 10 is 33 and 4 is 37 and 6 is 43, ſo the whole diſtance is 43 Miles 5 Furlongs 12 Poles, as *per* Work.

The diſtance from 4 Statues, *A*, *B*, *C*, *D*, being meaſured along a walk to an Obeliſk in a Noble man's Garden, was found to be as follows, *(to wit)* from *A*, to *B*, 140 Yards 2 feet 11 Inches, *B*, to *C*, 134 Yards 1 Foot 9 Inches *C*, to *D*, 151 Yards 4 Inches, and from *D*, to the Obeliſk 108 Yards 2 Feet 8 Inches. What was the whole diſtance.

			(3) *Yds.*	(12) *ft.*	*In.*	
From *A.*	to *B.*	*B*,	140	2	11	*N. B.* Inches
B.	to *C.*	*C*,	134	1	9	are caſt up in
C.	to *D.*	*D*,	151	0	4	the ſame man-
D.	to *Ob.*	*Ob.*	108	2	8	ner as Pence.
		Anſwer.	535	1	8	

CLOTH *MEASURE.*

4 Nails	1 Quarter		*Qr.*
4 Quarters	1 Yard		*Yd.*
5 Quarters is	1 Ell Engliſh	mark'd	*E. E.*
3 Quarters	1 Ell Flemiſh		*E. F.*
6 Quarters	1 French Ell		*F. E.*

A

A Draper at a Fair bought 5 pieces of Cloth, each piece containing as follows. *(viz.)*

	Yds.	(4) *qr.*	(4) *Nls.*
No. 1.	35	3	3
2.	46	1	2
3.	21	3	1
4.	47	2	3
5.	21	1	2
	173	0	3

N. B. That Nails and Quarters are cast up the same as Farthings.

	Yds.	(4) *qr.*	(4) *Nls.*
	67	2	3
	47	1	2
	72	2	3
	49	3	0
	67	0	3
	879	3	3
	98	1	2
Answer.	1283	0	0

LAND *MEASURE.*

			mark'd
144 square Inches	is	1 square Foot	Ft.
9 square Feet		1 Yard square	Yd.
30¼ Yards		1 statute Pole or Perch.	Pl.
40 Poles or Perches		1 Rood	Rd.
4 Roods.		1 Acre	Ac.

N. B. Ten Chains *(per Gunter)* in length, and one in breadth, are an Acre of Land. = 4840 Yards.

A Farmer Rents 4 pieces of Land containing

		(4)	(40)
	Ac.	*ro.*	*pls.*
In one Field	16	2	24
In another	24	3	14
In another	21	1	12
In another	13	2	34
Anſwer.	76	0	4

N. B. To caſt up Poles you have directions in Page 17, and the Roods are added as tho' they were farthings

WINE *MEASURE.*

2 Pints		1 Quart.
4 Quarts		1 Gallon.
10 Gallons		1 Anchor of Brandy.
18 Gallons		1 Rundlet.
31½ Gallons	is	1 Barrel.
42 Gallons		1 Tierce.
63 Gallons		1 Hogſhead.
84 Gallons		1 Puncheon.
2 Hogſheads		1 Butt.
2 Pipes or 4 Hogſheads		1 Tun.

Wines, Brandies, Spirits, Cyder, Mead, Vinegar, Oil, and Honey, are meaſured by this Meaſure. A Gallon = 231 ſolid Inches, Mr. SADLER ſays that Mr. WARD was witneſs to an experiment tried at *Guildhall* before the *Lord Mayor*, *&c.* when the old ſtandard Wine Gallon was found to contain exactly but 224 cubical Inches, yet for all that the ſuppoſed content of 231 Inches are continued. *See* SADLER's *Arithmetic*, *Page* 29.

A

A Nobleman bought of a *Wine Merchant*, the following ſorts and quantities of Wine, *(viz.)* Port, 1 Tun 1 Hhd. 36 Gallons, Claret, 2 Hhds. 49 Gallons, Mountain, 2 Hhds. 30 Gallons 4 Pints, and Liſbon 3 Hhds. 7 Pints. How much did he buy in all.

	Tun	(4) *Hhd.*	(63) *Gs.*	(8) *Pts.*
Port	1	1	36	0
Claret	0	2	49	0
Mountain	0	2	30	4
Liſbon	0	3	0	7
Anſwer	3	1	53	3

N. B. In this Example Hogſheads are caſt up the ſame as Farthings.

Ale *and* Beer *MEASURE.*

2 Pints	is	1 Quart.
4 Quarts		1 Gallon.
8 Gallons		1 Firkin of Ale.
9 Gallons		1 Firkin of Beer.
2 Firkins		1 Kilderkin.
4 Firkins		1 Barrel.
$1\frac{1}{2}$ Barrel or 54 Gallons		1 Hogſhead of Beer.

One Ale Gallon = 282 cubical Inches. The Ale Firkin in *London* contains 8 Gallons, and the Beer Firkin 9. But in other places in *England* it is (by a Statute of Exciſe made in the Year 1689) $8\frac{1}{2}$ Gallons to the Firkin.

A

A *London* Brewer ſent into the Country, Ale and Beer as follows, *(viz.)* at one time 4 *Hhds.* 19 *Galls.* at another 3 *Hhds.* 15 *Galls.* at another 12 *Hhds.* 24 *Galls.* at another 5 *Hhds.* 19 *Galls.* and at another 8 *Hhds.* 5 *Galls.* How much was ſent out in all

	Hhd.	(51) *Gs.*
Firſt time	4	19
Second time	3	15
Third time	12	24
Fourth time	5	19
Fifth time	8	5
Anſwer.	33	31

DRY *MEASURE.*

			mark'd
2 Pints		1 Quart	Qt.
4 Quarts		1 Gallon	Gal.
2 Gallons		1 Peck	Pks.
4 Peck or 8 Gallons	is	1 Buſhel	Bu.
4 Buſhels		1 Comb	C.
2 Combs or 8 Buſhels		1 Quarter	Qr.
5 Quarters		1 Wey	W.
2 Weys or 10 Quarters		1 Laſt	La.

A Gallon Dry Meaſure contains 268 4-5ths. cubic Inches at *London*, 36 Buſhels of Coals make a Chaldron. A Buſhel Water meaſure is 5 Pecks.

In one Laſt are 5120 Pints, 2560 Quarts, 1280 Pottles, 640 Gallons, 320 Pecks, 80 Buſhels, 10 Quarters, 2 Weys.

A

A Cornfactor delivers out of his Granery, the following quantities of Corn, *(to wit)* Wheat 7 Quarters, 1 Comb 3 Buſhels 2 Pecks, Rye 5 Quarters 1 Comb 2 Buſhels 1 Peck, Oats 4 Quarters 1 Buſhel 3 Pecks, and Barley 3 Quarters 1 Comb 3 Buſhels. What was delivered in all.

	Qr.	(2) *C.*	(4) *Bu.*	(4) *Pts.*
Wheat	7	1	3	2
Rye	5	1	2	1
Oats	4	0	1	3
Barley	3	1	3	0
Anſwer.	21	1	2	2

In this Example the Pecks and Buſhels are caſt up like Farthings, and the Combs like Halfpence.

TIME.

60 Thirds		1 Second.
60 Seconds		1 Minute.
60 Minutes		1 Hour.
24 Hours		1 Day.
7 Days	is	1 Week.
4 Weeks or 28 Days		1 Month.
52 Weeks 1 Day 6 Hours, or 13 Months 1 Day 6 Hours, or 365 Days 6 Hours		1 Year Julian.

365 Days 5 Hours 48 Minutes 57 Seconds 39 Thirds make a Solar Year.

A certain Perſon had 4 Sons, *Ralph*, *John*, *James*, and *Andrew*, when *John* was born *Ralph's* age was 2 Years 4 Months 1 Week 3 Days, when *James* was born, *John's* was 3 Years 5 Months 3 Weeks 4 days, and when *Andrew* was born, *James's* age was 4 Years 9 Months 1 Week 5 Days. How old was *Ralph* (the eldeſt Son) when *Andrew* the youngeſt was born.

(13) (4) (7)

					Ys.	m.	w.	d.
Ralph's	age when	*John*	was born		2	4	1	3
John's		*James*			3	5	3	4
James's		*Andrew*			4	9	1	5
				Anſwer	10	6	2	5

SUBTRACTION.

TEACHETH to take a leſſer number from a greater, and thereby ſhews the difference or remainder.

RULE.

I. Place your numbers according to the directions given in *Addition*.

II. Begin at the right hand, and Subtract each under figure from that which ſtands over it, writing each remainder under which it proceeds from, ſo ſhall all the remainder together expreſs the difference required.

III. But when the under figure exceeds that which ſtands over it, you muſt borrow ten, (the ſame which you ſtop at in *Addition*,) from which take the lower figure, and to that difference add the upper figure and the ſum ſet down, always remembering to carry one to the next figure on the left hand, before you ſubtract.

PROOF.

To the leſſer number add the remainder, if the ſum be like the greater, the work is right.

Example

EXAMPLES.

From	674874 *	789746
Take	598799	678946
Remains	76075	110800
Proof.	674874	789746

* To Subtract the firſt Example, I ſay 9 from 4 I cannot, but (putting 10 to the ſaid 4 it is made 14) 9 from 14 and there remains 5, which I ſet down under the line; then I ſay 1 that I borrowed and 9 (the next figure) is 10 from 7 I cannot, but 10 from 17 (adding 10 to the 7) and there remains 7, which I alſo ſet down; then 1 that I borrowed and 7 is 8 from 8 and there remains 0, (here I borrowed none, ſo I muſt not pay any thing to the next figure) then 8 from 4 I cannot, but (putting 10 to 4 makes it 14) 8 from 14 and there remains 6, which I alſo ſet down; then 1 that I borrowed and 9 is 10 from 7 I cannot, but (puting 10 to the ſaid 7 makes it 17) 10 from 17 and there remains 7; then 1 that I borrowed aud 5 is 6 from 6 and and there remains 0, ſo the work is done, and the remainder is 76075, as in the Example.

This method of proceeding is more methodical than to ſay 9 from 4 I cannot, but 9 from 10 (which I borrow) and 1 remains, which I add to 4 (the figure I ſubtract from) is 5; then 1 that I borrowed and 9 is 10 from 7 I cannot, but 10 from 10 and 0 remains, and becauſe I have no remainder, I ſet the 7 (which is above) down; then 1 that I borrowed and 7 is 8 from 8 and there remains 0; then 8 from 4 I cannot, but 8 from 10 and 2 remains, and 4 the top figure makes 6; then 1 that I borrowed and 9 is 10 from 10 and 0 remains, and ſet 7 the top figure down; laſtly, 1 that I borrowed and 5 is 6 from 6 and there remains 0. So the remainder is the ſame as in the above, *(viz.)* 76075.

N. B. This laſt method is as mentioned in the Rule.

Lent	987654	748746
Received	876543	674870
Remains	111111	73876
Proof	987654	748746

Debtor	748674	9000006
Creditor	687467	8000005
Balance	61207	1000001
Proof	748674	9000006

In the Year 1076, and on *Palm Sunday*, a blazing Star was ſeen near the Sun, I demand how many Years it is ſince.

1775 Year of our Lord,
1076

699 Anſwer. Years ſince.

In the Year 1231, thunder laſted 15 days, beginning the morrow after *St. Martin's* day, I demand how many Years is it ſince.

1775 Year of our Lord,
1231

544 Anſwer. Years ſince.

The *Monaſtry* of *St. Oſeth*, in *Eſſex*, was founded in the Year 1126, I demand how many Years it is ſince.

1775 Year of our Lord.
1126

649 Anſwer. Years ſince.

In

In the Year 1288, the extremity of the Sun's heat killed many, how many Years is it ſince.

1775 Year of our Lord,
1288

487 Anſwer. Years ſince.

King CHARLES the *Martyr* was beheaded in the Year 1648, how many Years is that ſince.

1775 Year of our Lord,
1648

127 Anſwer. Years ſince.

Roger Bacon a learned *Engliſh* Monk, of the *Franciſcan* Order, was born near *Ilcheſter* in *Somerſetſhire*, in the Year 1214, how many Years is that ſince.

1775 Year of our Lord,
1214

561 Anſwer. Years ſince.

The age of a Lady is twenty and three,
What year was ſhe born in, pray tell unto me.

1775 Year of our Lord,
23

1752 Anſwer.

Suppoſe I was born in the Year 1746, how old am I this preſent Year 1775.

1775
1746

29 Anſwer.

Rene des Cartes, a moſt eminent French Philoſopher, and Mathematician, was born in 1596, and died in 1650, how old was he at the time of his death.

1650
1596

54 Anſwer.

From 179*l.* borrowed, take 97*l.* Paid,
'Twas a Virgin that lent it, what's due to the Maid.

£. 179
97

82 Anſwer.

The height of the Monument at *London* is 202 feet, which is 24 feet higher than the *Trojan's* Piller at *Rome*, I demand the height of the Pillar.

202
24

Anſwer. 178 Feet.

The Fire of *London* happened in the Year 1666, how many Years is that ſince.

1775
1666

109 Anſwer.

The *Anabaptiſts* began to appear in the Year 1521, how many years is that ſince.

1775
1521

254 Anſwer.

King

King HENRY the VIII. was born in the Year of our Lord 1491, how many Years is that ſince.

1775
1491

284 Anſwer.

The *Quakers* began to appear in the Year 1655, how many years is that ſince.

1775
1655

120 Anſwer.

I demand the difference between twice twenty-five, and twice five, and twenty.

25 } add		add	{ 5	This Queſtion to ſome
25 }			{ 5	may ſeem a Paradoxical
—			—	affair, but 'tis no more
50 } Subtract		add	{ 10	than from twice 25 =
30 }			{ 20	50 Subtract twice five =
—			—	10 & 20 = 30.
Anſ. 20 difference			30	
—			—	

The old *Salopian PARR*, was preſented by the Earl of *Arundel* to KING CHARLES the Firſt, at the Age of 152 in the year 1635, how many years is that ſince.

From 1774
Take 1635

Anſwer 139

Compound SUBTRACTION.

TEACHETH to find the difference between any two ſums of divers denominations, as Money, weights, and Meaſures, *&c.*

R U L E.

Whatever you ſtop at in *Compound Addition*, the ſame you muſt borrow in *Subtraction*, when need requires, remembering always to pay it to the next figure towards the left hand.

	l.	*s.*	*d.*			*l.*	*s.*	*d.*	
From	671	9	2	¼	*	7486	19	11	¾
Take	586	10	6	¾		6789	18	6	½
Remains	84	18	7	½		697	1	5	¼
Proof	671	9	2	¼		7486	19	11	¾

* To Subtract the firſt Example, I begin at the leaſt denomination towards the right hand, *(viz.)* Farthings, ſaying, 3 from 1 I cannot, wherefore I borrow 1 from the next name, which is Pence, (one of which is 4 Farthings) and ſay 3 from 4 and there remains 1, (which remainder always add to the upper number, or figure you Subtract from, for the more eaſy reckoning) and the ¼ over it makes ½, which I place under the line, and go to the next denomination, which is Pence, ſaying, 1 that I borrowed and 6 is 7, from 2 I cannot, wherefore I borrow 1 from the next, which is Shillings, (one of which is 12 Pence) and ſay, 7 from 12 and there remains 5, which I put to the figure 2 I Subtract from, and it makes 7, which I alſo put under the line in its proper place; and then I go to the next denomination, which is Shillings, ſaying, 1 that I borrowed and 10 is 11, from 9 I cannot, wherefore I borrow 1 of the next, which is Pounds, (one of

of which is 20 Shillings) and ſay, 11 from 20, and there remains 9, and the 9 Shillings over it, (which I Subtract from) is 18, which I place under the line in its place; then going to the Pounds, I ſay, 1 that I borrowed and 6 is 7, from 1 I cannot, (here I borrow 10, as in ſums of one denomination) and ſay, 7 from 11 and there remains 4, and ſo on to the laſt, and the ſum is finiſhed, and the remainder, or difference is 84*l*. 18*s*. 7*d*. ½, as by the Example may be ſeen.

As Subtraction of Money, (be the ſum ever ſo great) is perform'd the ſame as above; it is needleſs to ſay any more, this Explanation being ſufficient.

Lent	£.	649	15	6	4867	15	6	¼
Received		594	18	10	3456	18	9	½
Remains		54	16	8	1410	16	8	¾
Proof		649	15	6	4867	15	6	¼
Debtor	£.	748	19	6 ½	5967	18	6	¼
Creditor		678	18	11 ¼	4671	19	8	½
Balance		70	0	6 ¼	1295	18	9	¾
Proof		748	19	6 ½	5967	18	6	¼

A Steward receives for his Grace the Duke of *C*------ the ſum of 5000*l*. 18*s*. 0*d*. out of which he has diſburſed upon the Duke's account, the ſum of 904*l*. 10*s*. 9*d*. what remains in the Stewards hands to pay his Maſter.

	l.	*s*.	*d*.	
From	5000	18	0	
Take	904	10	9	diſburſed.
Anſwer	4096	7	3	
Proof	5000	18	0	

Admit the Yearly Rent of a Houſe be 76*l.* 14*s.* 6*d.* and the Tenant hath diſburſed in Leys and Repairs 5*l.* 16*s.* 11*d.* what is due to the Landlord.

	l.	*s.*	*d.*	
From	76	14	6	Yearly Rent.
Take	5	16	11	diſburſed in Leys, *&c.*
	70	17	7	Anſwer

Admit an Officer of a Town hath received by aſſeſſment, 62*l.* 14*s.* 6*d.* and hath diſburſed on the Town's account 40*l.* 17*s.* 4*d.* what is due to the Town.

	l.	*s.*	*d.*	
From	62	14	6	Received by Aſſeſſments.
Take	40	17	4	Diſburſed on Town's Account.
	21	17	2	Anſwer.

A Perſon dying left 13111*l.* 10*s.* 6*d.* between his Son and Daughter; the Daughter was to have Eleven Thouſand, Eleven Hundred, and Eleven Pounds, what was the Son's fortune.

	l.	*s.*	*d.*		
					First 11000
From	13111	10	6		1100
Take	12111	0	0	Daughters Fortune.	11
	1000	10	6	Anſwer.	12111

A, is indebted to *B*, in the ſum of 1000*l.* *B*, owes *A*, 101*l.* 16*s.* 11*d.* how much does one owe more than the other.

	l.	*s.*	*d.*	
From	1000	0	0	*A's.*
Take	101	16	11	*B's.*
	898	3	1	Anſwer.
	1000	0	0	Proof.

A

A *Collector* of the *Excise* hath received 750*l.* 19*s.* 6*d.* and paid into the Office by several remittances, 439*l.* 17*s.* 4*d.* $\frac{3}{4}$. how much remains in his hands.

	l.	*s.*	*d.*		
From	750	19	6		Received.
Take	439	17	4	$\frac{3}{4}$	Paid into the Office.
Remains in his hands	311	2	1	$\frac{1}{4}$	Answer.
	750	19	6		Proof.

There were 4 bags of Money, containing as follows, *(viz.)* The first bag, 34*l.* the second bag 50*l.* the third bag 100*l.* the fourth 150*l.* – which were to be paid to several Persons; but one of the bags being lost, there was but 234*l.* paid: I demand which bag was wanting.

	34	Add.
	50	
	100	
	150	
From	334	The Sum of the whole.
Take	234	Sum paid.
Remains	100	The third Bag wanting.

	l.	*s.*	*d.*	
Borrowed of my friend,	84	16	0	
Paid him in Cash and Goods,	79	16	9	$\frac{1}{2}$
Remains unpaid,	4	19	2	$\frac{1}{2}$
Proof,	84	16	0	

TROY *WEIGHT.*

For Table of Troy Weight, *see Page*, 14.

To Subtract Weights and Measures, is done in the same manner as Money, only observe to borrow, and add, (or repay) according to each denomination.

A Lady bought of a Silversmith, a Silver Tankard weighing 3*lb.* and 13*gr.* and a Silver Cup 1*lb.* 2*oz.* 10*dwt.* 16*gr.* how much heavier is the Tankard than the Cup.

	lb.	*oz.* (12)	*dwt.* (20)	*gr.* (24)	
From	3	0	0	13	the weight of the Tankard.
Take	1	2	10	16	the weight of the Cup.
Remains	1	9	9	21	Answer.
Proof	3	0	0	13	

N. B. When the under figure exceeds the above, you must borrow according to your Table, or as you see expressed on the top of each denomination: the like to be observed in all the Weights and Measures following, in this Rule.

Avoirdupois *WEIGHT.*

For Table of Avoirdupois Weight, *see Page*, 13.

A Waggon load of Coals being weighed, Waggon and all, by a Machine, was 2 *Tons* and 4 *Hundreds*, what was the weight of the Coals, when the Waggon weighed alone 10*C.* 2*qr.* 14*lb.*

From

	(20) *T.*	(4) *C.*	*qr.*	(28) *lb.*	
From	2	4	0	0	Groſs weight.
Take	0	10	2	14	Weight of the Carriage.
Anſwer.	1	13	1	14	
Proof	2	4	0	0	

Apothecaries *WEIGHT.*

For Table of Apothecaries Weight, *ſee Page*, 16.

What is the difference betwixt 28*lb.* 10*oz.* and 2*lb.* 5*oz.* 3*dr.* 2*ſcr.* 13*gr.*

	(12) *lb.*	(8) *oz.*	(3) *dr.*	(20) *ſcr.*	*gr.*
From	28	10	0	0	0
Take	2	5	3	2	13
Anſwer	26	4	4	0	7
Proof	28	10	0	0	0

LONG *MEASURE.*

For Table of Long Meaſure, *ſee Page*, 17.

From a certain Town *A*, to *London* is 26 miles, 4 furlongs and 16 Poles, and from *A*, to a Windmill on the road is, 4 miles, 7 furlongs and 34 poles, how far is the Windmill from *London*.

	(8) *M.*	(40) *F.*	*P.*	
From	26	4	16	
Take	4	7	34	
Remains	21	4	22	Anſwer
Proof	26	4	16	

CLOTH *MEASURE.*

For Table of Cloth Meaſure, *ſee Page*, 18.

A Linen-Draper bought at *Cheſter* Fair, 496 Yards of *Iriſh* Cloth, out of which he ſold, 289 Yards 2 Quarters and 3 Nails, how much remains unſold.

	Yds.	(4) *qr.*	(4) *nls.*	
From	496	0	0	Cloth bought.
Take	289	2	3	Cloth ſold.
Anſwer	206	1	1	
Proof	496	0	0	

LAND *MEASURE.*

For Table of Land Meaſure, *ſee Page*, 19.

A Gentleman has a large tract of Land containing 207 Acres, which he intends to convert into a Park, out of which he would firſt encloſe 24 Acres 2 Roods and 18 Poles, for a Mantion Houſe, Gardens, *&c.* what will the contents of the Park be.

	Ac.	(4) *rds.*	(40) *pls.*
From	207	0	0
Take	24	2	18
Anſwer	182	1	22
Proof	207	0	0

Wine

WINE *MEASURE.*

For Table of Wine Meaſure, *ſee Page*, 20.

A Nobleman hath two Cellars, the larger contains, of ſeveral kinds of Liquors, 2 Tuns and 1 Hogſhead, and the other 1 Tun 2 Hogſhead 56 Gallons and 5 Pints, how much Liquor is there in one more than the other.

	(4) *T.*	(63) *hhds*	(8) *gs.*	*pts.*
From	2	1	0	0
Take	1	2	56	5
Remains	0	2	6	3
Proof	2	1	0	0

Anſwer. 2*hhds.* 6*gs.* 3*pt.* *ſee* SADLER's *Arithmetic.*

Ale *and* Beer *MEASURE.*

For Table of Ale *and* Beer Meaſure, *ſee Page*, 21.

A *Brewer* delivers in one day to his cuſtomers, 12 *Hhds.* and 4 *Galls.* in another day 15 *Hhds.* 47 *Galls.* what is the difference.

	Hhds.	*Gal.*	
From	15	47	
Take	12	4	
Anſwer	3	43	Difference.
Proof	15	47	

Dry

DRY *MEASURE.*

For Table of Dry Measure, *see Page*, 22.

Out of 9 Quarters and 1 Comb, take 2 Pecks.

	(2)	(4)	(4)
	Qr.	*C.*	*Bu.*	*Pks.*
From	9	1	0	0
Take	0	0	0	2
Remains	9	0	3	2
Proof	9	1	0	0

See Sadler's *Arithmetic. Page* 66.

TIME.

For Table of Time, *see Page*, 23.

JACOB agrees by contract, to serve LABAN 14 Years for his two Daughters, LEAH, and RACHEL, how long had he to serve when 10 Years, 10 Months, 10 Weeks, 10 Days, 10 Hours, 10 Minutes, and 10 Seconds, of that time were elapsed.

	(12)	(4)	(7)	(24)	(60)	(60)
	Yrs.	*mo.*	*we.*	*d.*	*ho.*	*min.*	*sec.*
From	14	0	0	0	0	0	0
Take	11	0	3	3	10	10	10
Anſwer	2	11	0	3	13	49	50
Proof	14	0	0	0	0	0	0

Queſtion by Mr. *T. Mayoh*, *ſee his Arithmetic*, *Page* 19.

	Yrs.	*m.*	*w.*	*d.*	*h.*	*m.*
Suppoſe a Boy bound an Apprentice for	10	0	0	0	0	0
And has ſerved - -	9	9	9	9	9	9
How long has he to ſerve. Anſwer.	0	0	1	4	14	51
Proof.	10	0	0	0	0	0

MULTIPLICATION.

THIS Rule ſheweth compendiouſly to perform the work of many *Additions*; for any number may be ſpeedily increaſed, according to any propoſed number of lines.

In *Multiplication* are three things particularly to be noted.

I. The *Multiplicand*, or number to be Multiplied.

II. The *Multiplier*, or number by which you Multiply.

III. The Product, which is the Anſwer.

R U L E.

Place the Multiplier under the units place of the Multiplicand, and Multiply the units figure of the Multiplicand by the Multiplier, if their product be leſs than ten, ſet it down under its own place of units, but if their product exceeds ten (or tens) then ſet down the exceſs only, (as in *Addition*) and bear (or carry) the ſaid ten (or tens) in mind, until you have multiply'd the next figure of the Multiplicand, by the ſame figure of the Multiplier, and to their product add one for each ten, ſetting down the exceſs of their ſum, above ten or tens, and ſo proceed in the ſame manner, 'till all the figures are multiplied.

THE TABLE.

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
	3	9	12	15	18	21	24	27	30	33	36
		4	16	20	24	28	32	36	40	44	48
			5	25	30	35	40	45	50	55	60
				6	36	42	48	54	60	66	72
					7	49	56	63	70	77	84
						8	64	72	80	88	96
							9	81	90	99	108
								10	100	110	120
									11	121	132
										12	144

This Table is ſo plain and eaſy that it needs no Explanation.

* 67487487 by 2	6748748 3	594874 4
134974974	20246244	2379496

* In the *1st.* Example I say, twice 7 is 14, set down 4 and carry 1 for the ten; then say twice 8 is 16, and 1 that I carried is 17, set down 7 and carry 1; twice 4 is 8 and 1 is 9, set down 9; and say, twice 7 is 14, set down 4 and carry 1; then twice 8 is 16 and 1 is 17, set down 7 and carry 1; then twice 4 is 8, and 1 is 9, set down 9; and say, twice 7 is 14, set down 4 and carry 1; lastly, twice 6 is 12 and 1 that I carry is 13, and because it is the last figure set all the 13 down, and so of the other Examples. So the product is 134974974.

The surest way to prove *Multiplication* is by *Division*, which is to divide the product by the Multiplier, and if the Quotient comes the same as the Multiplicand, the work is right.

6874874 5	6797481 6	6748107 7
34374370	40784886	47236749
486748 8	7874067 9	7486746 10
3893984	70866603	74867460

6874814 11	7487467487 48 12
75622954	89849609849 76

When the Multiplier consists of more figures than one, then there must be as many several products, as there are figures in the Multiplier, and placed under the line and added together, and the total is the whole Product required. But observe always to place the first figure of each Product, just

juſt under the figure you multiply by, and ſo move one place towards the left hand, for every Product, be as many as there will.

* Multiply 674874674 Multiplicand.
by 36 Multiplier.

4049248044
2024624022

Product 24295488264

* To work this Example, you begin and multiply the Multiplicand by the unit figure of the Multiplier, which is 6, and the Product will be 4049248044, then multiply the Multiplicand by 3, the other figure of the Multiplier, and the product will be 2024624022, which ſet down according to their places, and add them together, and you will find the Product to be 24295488264, or to prove Multiplication, multiply the Multiplier by the Multiplicand, and if the product is the ſame as the other, the work is right. See the Proof of the above Example.

36
674874674

144
252
216
144
252
288
144
252
216

Product 24295488264

N. B. Obſerve to place the firſt figure of each Product juſt under the figure you multiply by, as in this Example may be ſeen.

The ſame as before in the above Operation.

Multiply

```
Multiply    74867486744
              by    678
          ---------------
          598939893952
         524072407208
        449204920464
        ---------------
        50760156012432
```

When the Multiplier is such a number, that any two numbers in the *Multiplication Table*, being multiplied together make the said Multiplier; then multiply the Multiplicand by one of the numbers, (it matters not which you multiply first by) and then multiply that Product by the other number, the last Product will be the Answer.

```
Multiply  7486748746  by  36.
                   6
          ------------
          44920492476
                    6
          ------------
          269522954856
```

```
Multiply  594674874  by  48.
                   8
          ------------
          4757398992
                   6
          ------------
          28544393952
```

In the first Example I multiply the Multiplicand by 6, and that Product again by 6, for 6 x 6 is = 36, the Multiplier. See the Proof of the same Example.

748

```
  7486748746
          36
 ------------
 44920492476
22460246238
 ------------
269522954856
```

The Product you see is the same as in the preceding Operation.

```
Multiply  6748746  by  50.
                 10
          ---------
          67487460
                 5
          ---------
          337437300
```

In this Example I multiply first by 10, and then by 5, for 10 x 5 = 50 the Multiplier: and so of any other Multiplier, when two numbers x together will produce it.

```
Multiply  7486746 by 60.
                 10
          ---------
          74867460
                 6
          ---------
          449204760
```

```
Multiply  987654321 by 66.
                 11
          ----------
          10864197531
                  6
          ----------
          65185185186
```

```
Multiply  74867494 by 72.
                  8
          ---------
          598939952
                  9
          ---------
          5390459568
```

```
Multiply  67894674 by 120
                 12
          ---------
          814736088
                 10
          ---------
          8147360880
```

Multiply

Multiply 48674867 by 132. Multiply 67487467 by 144

12	12
584098404	809849604
11	12
6425082444	9718195248

When there are Cyphers at the end of the Multiplicand, or Multiplier, or at the end of both the Multiplicand and Multiplier, then omit the Cyphers 'till you have multiplyed by the significant figures, and join the Cyphers to the right hand of the Product.

Multiply 67487400 by 46700

46700

4724118
4049244
2699496
3151661580000

In this Example I have Multiplied by 467, as tho' there were no Cyphers, and have join'd the Cyphers to the right of the Product, the like is to be obſerved in the next.

Multiply 6748746900
by 43300

202462407
202462407
269949876
292220740770000

When you multiply by any of theſe Compound numbers, *(viz.)* 110, 120, 1100, 1200, then multiply as before, and annex the Cyphers afterwards,

6740874	684916
110	120
741496140	82189920

5674067	876543
1100	1200
6241473700	1051851600

How to Multiply by any number under 20, so as to bring the whole work into one line: Multiply each figure in the Multiplicand, by the unit figure of the Multiplier, adding to each single Product its back figure, and to the last figure add what you carry.

674874	748674
14	15
9448236	11230110

Explanation of the first Example.

* Say 4 times 4 is 16, set 6 down and carry one, 4 times 7 is 28, and 1 that I carry is 29, and 4 the back figure is 33, set down 3 and carry 3; 4 times 8 is 32 and 3 that I carry is 35, and 7 the back figure makes 42, set down 2 and carry 4; 4 times 4 is 16, and 4 that I carry is 20 and 8 the back figure makes 28, set down 8 and carry 2; 4 times 7 is 28, and 2 is 30, and 4 the back figure is 34, set down 4 and carry 3; 4 times 6 is 24, and 3 is 27, and 7 the back figure is 34; set down 4 and carry 3; and 6 is 9, which set down, and the Product will be the same as if you Multiply'd the same sum at twice, and the Products together, as has been before shewn.

The Proof of this Example may be seen, by multiplying it in two lines thus.

674874	
14	
2699496	
674874	
9448236	The same as in the above operation.

587654	876507
16	17
9402464	14900619
748674	674906
18	19
13476132	12823214

Suppose it were required to multiply 67468746
by 111114 in one line.

Product 7496722243044 Answer.

See the Explanation.

Say 4 times 6 is 24, set down 4 and carry 2; then 4 times 4 is 16, and 2 that I carry is 18, and the back figure 6, makes 24, set down 4 and carry 2; then 4 times 7 is 28, and 2 is 30, and 4 is 34, and 6 is 40 set down 0, and carry 4; then 4 times 8 is 32, and 4 that I carry is 36, and 7 is 43 and 4 is 47 and 6 is 53, set down 3 and carry 5; then 4 times 6 is 24, and 5 that I carry is 29, and 8 is 37 and 7 is 44 and 4 is 48 and 6 is 54, set down 4 and carry 5; then 4 times 4 is 16, and 5 that I carry is 21, and 6 is 27, and 8 is 35, and 7 is 42, and 4 is 46, and 6 is 52, set down 2 and carry 5; then 4 times 7 is 28, and 5 that I carry is 33, and 4 is 37, and 6 is 43, and 8 is 51, and 7 is 58, and 4 is 62, set down 2 and carry 6; then 4 times 6 is 24, and 6 that I carry is 30, and 7 is 37, and 4 is 41, and 6 is 47, and 8 is 55, and 7 is 62, set down 2 and carry 6; then as you have multiply'd all the figures in the Multiplicand, you add what you carry, beginning at the next figure to the last back figure you took, which was 7, saying, 6 that I carry and 8 is 14, and 6 is 20, and 4 is 24, and 7 is 31. and 6 is

37

37, set down 7 and carry 3; saying 3 and 6 is 9, and 4 is 13, and 7 is 20, and 6 is 26, set down 6 and carry 2; saying 2 and 4 is 6, and 7 is 13, and 6 is 19, set down 9 and carry 1; saying 1 and 7 is 8, and 6 is 14, set down 4 and carry 1; 1 and 6 is 7, so the Product is 7496722243044: after the same manner you may multiply any number of figures expressed in the same manner, with ones before the right hand figure, by adding the back figures to the Product, according to their places.

```
Or          67468746
               111114
          ------------
           269874984
            67468746
           67468746
          67468746
         67468746
        67468746
        ------------
Product 7496722243044 the same as before.
```

To Multiply by 1614, or 1517, or by 1716, &c. First multiply by 14 in one line, and by 16 in the other, or by 17 in one line, and 15 in the other, &c. as the Case shall be.

```
 * 74874674          7487467
       1614              1517
 ----------        ----------
  1048245436         127286939
 1197994784         112312005
 ----------        ----------
 120847723836       11358487439
```

* To proceed in the first Example, Multiply first by 14, and then by 16, as you have been shewn in the preceding Page, and add their Product together for the true Product, so of the other Examples.

87467491	643248
1719	1514
1661882329	9005472
1486947347	9648720
150356617029	973877472

To Multiply by a mix'd number, that is a whole number join'd with a Fraction, whether it be $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{3}$, or $\frac{1}{5}$.

Rule, When you have multiply'd by the whole number, take the $\frac{1}{4}$, the $\frac{1}{2}$, the $\frac{3}{4}$, the $\frac{1}{3}$, or the $\frac{1}{5}$, of the Multiplicand, and add it to the Product, and that total shall be the whole Product.

In 276 Barrels of Raisins each $3\frac{1}{4}$ *C.* how many *Cwt.*

276	
3	*Note* For $\frac{1}{4}$
828	you take a
69	fourth of the given number.
Answer 897	

In 973 Hogsheads of Sugar each $7\frac{3}{4}$ *C.* how many *Cwt.*

68 1	*Note* For $\frac{3}{4}$ take
486 $\frac{1}{2}$	half and a fourth
243 $\frac{1}{4}$	and add them
7540 $\frac{3}{4}$	together. Answer.

In 362 Hogsheads. each $5\frac{1}{2}$ *C.* how many *Cwt.*

	Note For $\frac{1}{2}$ you
1810	take half of the
181	given number.
1991	Answer.

In 374 Casks. each $16\frac{1}{3}$ *C.* how many *Cwt.*

	Note For $\frac{1}{3}$ take
5984	a third of the
124 $\frac{2}{3}$	given number.
6108 $\frac{2}{3}$	Answer.

Admit 100 Men take a Prize, and each Man's share amounts to 150*l.* What is the value of the Prize.

£. 150
100 Men.

Answer 15000 £. Value of the Prize.

A

† A careful maid had thirty hens,
Laid twenty eggs *per* day;
She took great pains to search her pens,
Wherein her treasure lay:
The eggs she sold, the cash put by,
Still to increase her store,
Resolved was to buy a Cow,
With five pounds and no more.
How many eggs must there be sold,
To purchase *Tidy* * say;
At five for two-pence, pray unfold
the same for *Nancy Ray*.

First Multiply	100*s.* = 5 £.	
by	6	the two-pences in 1£.
Second, Multiply	600	
by	5	Eggs.
Answer.	3000	Eggs.

‡ At *Hackney*, a Country Village in *Middlesex*, it is said are 500 houses; now allowing 6 persons in each house, what number of people are there in it.

	500	Houses.
	6	Persons.
Number of Persons,	3000	Answer.

† *See* Sadler's *Arithmetic*, *Page* 78.
* *The name of the Cow*,
‡ *From* Sadlers *Arithmetic*.

The Water-works at *London* Bridge, are ſaid to raiſe 1954 Hogſheads in an hour, to the height of 120 feet, now ſuppoſe they work 8 hours every day, one day with another, how many Hogſheads will be raiſed up in one Year.

	1954	Hogſheads.
	8	Hours *per* day.
	15632	
	365	Days *per* Year.
	78160	
	93792	
	46896	
Anſwer.	5705680	Hogſheads.

Babylon once a famous and ancient City in *Egypt*, ſtood upon a ſquare of 15 Miles each way, how much ground did the whole City ſtand upon.

	15 }	Miles ſquare.
	15 }	
Anſwer.	225	Miles.

A Man walked laſt *Monday*, from *Shoredich* to the five mile ſtone from thence, and returned in the Afternoon, and did ſo every day in the week, *Sunday* excepted, how many miles did he walk during the ſix days.

	10	Miles *per* day, *viz.* 5 there & 5 back again.
	6	
Anſwer.	60	Miles.

Compound

COMPOUND
MULTIPLICATION.

TEACHETH to Multiply (by one common Multiplier) any ſum or number conſiſting of divers denominations.

Firſt. Write the Multiplier (or given quantity) under the loweſt denomination of the Multiplicand.

Second. Multiply the number of the loweſt denomination, by the Multiplier, and divide that Product by as many of that as make one of the next higher denomination, the ſame which you ſtop'd at in *Addition*, ſet down the remainder underneath it's own place, and add the Quotient to the next ſuperior denomination, as you multiply; in this manner proceed with all the other denominations to the higheſt.

*	674	18	9		5971	14	8 ¾		748	17	6
			2				3				4
	1349	17	6		17915	4	0 ¾		2995	10	0

Explanation of the Firſt Example.

* To Multiply the *1ſt.* Example, ſay, twice 9 is 18*d.* which is 1*s.* 6*d.* ſet the 6*d.* down under the pence, and carry 1*s.* to the Shillings; ſaying, twice 18 is 36, and 1 that I carry is 37*s.* which is 1*l.* 17*s.* ſet the 17*s.* down under the Shillings, and carry 1 to the next; ſaying, twice 4 is 8 and 1 is 9, then twice 7 is 14, ſet down 4 and carry 1; laſtly, twice 6 is 12. and 1 is 13, ſo the Product is 1349*l.* 17*s.* 6*d.*

The ſame is to be obſerved in any other.

749	15	11		678	17	6		487	14	6	¼			
		5				6					7			
3748	19	7		4073	5	0		3414	1	7	¾			
749	18	8		594	18	7	½	674	19	6				
		8				9				10				
5999	9	4		5354	7	7	½	6749	15	0				
721	14	8	¼					59678	19	10	¼			
		11								12				
7939	1	6	¾					716147	18	3				

When the given quantity exceeds 12, and is such a number that any two figures (in the *Multiplication Table*) being multiplied together will produce it.

RULE.

Multiply the given Price by one of those numbers, and that Product by the other, which will give the Answer.

* 24*lb.* of Tea at 4*s.* 6*d. per lb.*

	s.	*d.*	
	4	6	
		8	
1	16	0	
		3	
5	8	0	Anſ.

36*yds.* at 6*s.* 6*d. per yd.*

s.	*d.*	
6	6	In this Example I have
	9	multiply'd
2	18	6 by 9 and 4,
	4	for 9 x 4 =
11	14	0 Anſ. 36 the quantity.

* To work this Example ſay, 8 times 6 is 48 Pence, or 4 Shillings, ſet down 0 and carry 4 to the next, ſaying, 8 times 4 is 32, and 4 is 36, or 1 Pound 16 Shillings, the firſt Product being finiſhed, multiply that by the other number, (*viz.*) 3, and proceed as before.

48 Ells

48 Ells, at 4*s.* 3 *per Ell.*

	s.	d.	
	4	3	In this Example
		8	I have multiply'd by
			8 and 6, for 8 x 6
1	14	0	= to 48 the quan-
		6	tity.
10	4	0	Anſ.

50*lb.* at 6*s.* 4*d.* ½ *per lb.*

*	s.	d.	
	6	4	½
			10
3	3	9	
			5
15	18.	9	Anſ.

* In this Example I have multiply'd by 10 and 5, for 10 x 5 = 50, the quantity. The like is to be obſerved in the Examples following.

60 *Dozen* at 16*d. per Doz.*

	s.	d.	
	1	4	= 16*d.*
		10	
0	13	4	
		6	
Anſ. 4	0	0	

77 *Yds.* of Superfine broad Cloth at 19*s.* 6*d. per Yd.*

	s.	d.	
	19	6	
		11	
10	14	6	
		7	
Anſ. 75	1	6	

80 *Ells*, at 3*s.* 9*d. per Ell.*

	s.	d.	
	3	9	
		10	
1	17	6	
		8	
15	0	0	

99 Meaſures of Wheat at 8*s.* 6*d. per M.*

	s.	d.	
	8	6	
		11	
4	13	6	
		9	
42	1	6	

100 *Groce* of Pipes, at 18*d. per Groce.*

	s.	d.
	1	6
		10
	9	15 0
		10
	7	10 0

110 *Loads* of Malt, at 37*s. per Load.*

	l.	s.	d.
	1	17	0
			11
	20	7	0
			10
	203	10	0

120 Miles, at 6*s.* 9*d per M.*

	s.	d.
	6	9
		12
4	1	0
		10
Anſ. 40	10	0

132 Yards of Flowered Silk, at 27*s. per Yd.*

	s.	d.
	1	7 0
		12
16	4	0
		11
Anſ. 178	4	0

144 Meaſures of Barley, at 4*s.* 6*d. per* Meaſure.

	s.	d.
	4	6
		12
2	14	0
		12
Anſ. 32	8	0

When the given quantity cannot be produced by the Multiplication of two ſmall numbers.

R U L E.

Find the neareſt number to it leſs, by which multiply as before, then for what is wanting multiply the Price by that number, and add it to the laſt Product, and the total will be the Anſwer.

* 37 *Ells*, at 4*s*. 8*d*. *per Ell*.

	s.	*d*.	
	4	8	
		12	
2	16	0	
		3	
8	8	0	value of 36.
	4	8	value of 1,
8	12	8	Anſwer.

49 *Yds*. of flower'd Silk, at 1*l*. 10*s*. 6*d*. *per Yd*.

l.	*s*.	*d*.	
1	10	6	In this Example I have multiply'd by 12
		12	
18	6	0	& 4, for 12 x 4
		4	= 48, which is 1 ſhort of the given quantity
73	4	0	therefore I have
1	10	6	added the Price
74	14	6	of 1 *Yd*. to it. Anſwer.

* In this Example, as no two numbers multiply'd together make the quantity, I take the two neareſt under it, which are 3 and 12, for 12 x 3 = 36, then 1 remains, the price of which muſt be added to the value of 36, and conſequently the ſum will be the Price of 37, as above.

67 *Ells* of Cloth, at 4 *s*. 7 ¼ *d*. *per Ell*.

		11	
2	10	7 ¾	
		6	
15	3	10 ½	value of 66 *Ells*.
	4	7 ¼	add the value of 1.
15	8	5 ¾	Anſwer.

In this Example I have taken the two neareſt numbers under the given quantity, whoſe Product is 66 by which I have found the value of that number to be 15*l*. 3*s*. 10*d*. ½, to which I add the value of 1 *Ell*, it makes 15*l*. 8*s*. 5*d*. ¾.

N. B. If the numbers had been above your given number, you muſt have ſubtracted as many times the value from it, as it was above the given number,

When the given quantity consists of $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$.

RULE.

Divide the upper line (the Price of one) by 4, for $\frac{1}{4}$, by 2 for $\frac{1}{2}$, and for $\frac{3}{4}$ by 2 first, then divide that Quotient by 2 for $\frac{1}{4}$; add them to the Product, and the sum will be the Answer required.

lb.			*d.*	
28 $\frac{1}{4}$ of Sugar, at			9 $\frac{3}{4}$	*per lb.*
			7	
		5	8 $\frac{1}{4}$	In this Example I have multiply'd the Price by 7 and 4 for 7 x 4 = 28, and for $\frac{1}{4}$ have taken a fourth of the Price and added them together, gives the Answer. so of the rest.
			4	
	1	2	9	
			2 $\frac{1}{4}$	$\frac{1}{4}$ of the Price.
	1	2	11 $\frac{1}{4}$	Answer.

Tons.		*l.*	*s.*	*d.*	
35 $\frac{1}{2}$ of Hay, at		3	0	6	*per* Ton.
				7	
		21	3	6	
				5	
		105	17	6	
		1	10	3	$\frac{1}{2}$ the value of a Ton,
		107	7	9	Answer.

C.	*l.*	*s.*	*d.*	
30 ¾ of Cheese, at	1	6	6	*per C.*
			10	
	13	5	0	
			3	
	39	15	0	value of 30 *C.*
	0	13	3	half the value of *C.*
	0	6	7 ½	¼ the value of *C.*
	40	14	10 ½	Answer.

To work this Example, you must proceed with the whole number as in *Page* 52, and for the ¾ take ½ and ¼ of the given value, and add them together, and you have the Answer. See the Work.

Or, take half of the given value, and then the half of that half for a ¼, brings it to the same point as before.

An Example for Practice.

Old Farmer *Careful* fond of Pelf,
To Badger *Fairtongue* sold
His Wheat, and seems to hug himself,
And smile upon the Gold.
A hundred Bushels were agreed,
The Badger straight to bring,
At nine and six-pence! * true indeed, * *per* Bushel.
It made old *Careful* sing.
What did the whole come to, declare,
Which pleased Clod so well;
And made him hobble, sing, and stare,
Ingenious *Tyro* tell.

	9	6	*per* Bushel.
		10	
	4	15	0
		10	
£.	47	10	0

This is no more than to x the Price by 10 and 10, for 10 x 10 = 100 the quantity of Wheat.

See SADLER's *Arithmetic.*

TROY *WEIGHT.*

For Tables *of Weights, and Meaſures, ſee the Pages as mentioned in* Subtraction.

Weights, Meaſures, *&c.* are multiply'd in the ſame manner as Money, only remember to carry according to each denomination that reſpectively pertain thereto.

Admit a Silverſmith has 5 bars of Silver, each bar 4*lb.* 8*oz.* 10*dwt.* 4*gr.* what is the weight of the whole.

	(12)	(20)	(24)	
	lb.	*oz.*	*dwt.*	*gr.*
	4	8	10	4
				5 *No.* of Bars.
Weight	23	6	10	20

In the above Example I ſay, 5 times 4 is 20, which is leſs than 24, and will not reach Penny-weights, therefore I ſet 20 down; and ſay, 5 times 10 is 50*dwt*, which is 2*oz.* and 10*dwt.* over, which 10 ſet down under the *dwt.* and carry 2 to the Ounces; then 5 times 8 is 40, and 2 that I carry is 42*oz.* which is 3*lb.* and 6*oz.* over, which 6 I ſet under the Ounces, and carry 3 to the Pounds; ſaying, 5 times 4 is 20, and 3 that I carry is 23: and ſo of the reſt, according to their denominations.

Apothecaries *WEIGHT.*

An *Apothecary* has 7 mixtures, each 3*lb.* 2*oz.* 3*dr.* 2*ſc.* 12*gr.* what is the weight of the whole mixtures.

	lb.	*oz.*	*dr.*	*ſcr.*	*gr.*	
Multiply	3	2	3	2	12	
						by 7 Mixtures.
Anſwer.	22	5	3	0	4	

Avoirdupois

Avoirdupois *WEIGHT.*

What is the weight of 10 Casks of Raisins, when each Cask weighs 4*C.* 2*qr.* 20*lb.*

	C.	*qr.*	*lb.*	
Multiply	4	2	20	
	by		10	*No.* of Casks.
Anſ.	46	3	4	

LONG *MEASURE.*

Multiply 40 Miles, 2 Furlongs, and 16 Poles, by 27.

M.	*Fur.*	*Pls.*	
40	2	16	In this Example, I have
		9	multiply'd by 9 and 3, for
			9 x 3 = 27, the Multiplier.
362	5	24	
		3	
Product 1088	0	32	

Note (as before) When your Multiplier is ſuch a number, that any two numbers in the *Multiplication Table* being multiply'd together will produce it, then proceed as has been before ſhewn in *Compound Multiplication.*

CLOTH *MEASURE.*

If a Shopkeeper bought 48 pieces of *Iriſh* Cloth, each piece containing 32 Yards, 2 Quarters and 3 Nails, what quantity did he buy.

Yds.	*qr.*	*nls.*	
32	2	3	In this Example I multiply by 8
		8	and 6, for $8 \times 6 = 48$ the quantity.
261	2	0	
		6	
1569	0	0	Anſwer. 1569 Yards.

LAND *MEASURE.*

If a Gentleman hath 64 Pieces of Land, each Piece containing 6 Acres, 3 Roods, and 10 Poles; what is the content of the whole.

Ac.	*Ro.*	*Pls.*	
6	3	10	Multiply by 8 and 8, for
		8	$8 \times 8 = 64$, the quantity.
54	2	0	
		8	
Anſwer. 436	0	0	

WINE *MEASURE.*

Tons.	*hhds,*	*gals.*	
Multiply 8	2	14	by 98.
		12	
102	2	42	
		8	
821	1	21	
17	0	28	twice the quantity added.
838	1	49	Anſwer.

In

In the preceding Example, as no two numbers multiply'd together will make 98, I take 8 and and 12, for 12 x 8 = 96, which wants 2 of the given number, therefore I multiply the quantity by 2 and add that Product to the Product of 96, that sum is the Anſwer required.

Note, For Queſtions of this nature, proceed as in Page 55, wherein you'll find directions,

BEER *MEASURE.*

	Hhds.	*gs.*	*qts.*	
Multiply	15	18	3	by 120
			12	Here I x by 12 and 10, for 12 x 10 = 120.
	184	9	0	
			10	
Anſwer.	1841	36	0	

DRY *MEASURE.*

	L.	*qr.*	*bu.*	*pks.*	
Multiply	6	3	7	3	by 122.
				12	
	76	7	5	0	
				10	
	767	6	2	0	120.
	12	7	7	2	Product by 2.
Anſwer.	780	4	1	2	122.

In this Example I multiply by 10 and 12, for 10 x 12 = 120, which is 2 ſhort of the given Multiplier, then to that Product add the Product by 2, the total is the Anſwer.

TIME.

Multiply 9 Months, 2 Weeks, 4 Days, 12 Hours, 4 Minutes, by 190.

	Mon.	*w.*	*d.*	*h.*	*min.*	
Anſwer.	1255	3	4	8	40	Diviſion

DIVISION.

THIS RULE is that by which we difcover how often one number is contained in another.

Alfo by it you may divide any number into as many equal Parts as you pleafe.

And it is a compendious way of Subtracting one number from another.

In this Rule are always 4 remarkable numbers, which are commonly called by thefe names.

I. The *Dividend*, or fum to be divided.

II. The *Divifor*, or number by which you divide.

III. The *Quotient*, which is the Anfwer.

IV. The *Remainder*, which muft always be lefs than the *Divifor*.

	* 2)648748	3)748674	4)788474
Quotient.	324374	249558	197118-2

* To proceed in the firft Example, fay, how oft 2 in 6, which is 3 times, fet down 3 under the 6; and fay, how oft 2 in 4, which is twice, fet down 2 under the 4; then fay, how oft 2 in 8, which is 4 times, fet down 4; then fay, how oft 2 in 7, which is 3, for 3 times 2 are 6, and 1 over, fet down 3 under the 7, and call that 1 that is over, 10, and add it to the next figure in the Dividend, (which is 4) and it makes 14; then fay, how oft 2 in 14, which is 7 times; laftly, how oft 2 in 8, is 4 times, fet down 4, and it is done. So I find by the work, that 2 is contained in 648748, juft 324374 times: or, if the Dividend had been fo many Shillings, or Pounds, to be parted between two Perfons, each Perfon muft have had fo many Shillings or Pounds for his fhare.

N. B.

N. B. When the figure of your Dividend is leſs than the Diviſor, or firſt figure of your Diviſor, then make the two firſt figures of the Dividend your Dividual, and work as before.

To prove the ſaid Example, multiply the Quotient by the Diviſor, ſaying, twice 4 is 8; twice 7 is 14, ſet down 4 and carry 1; twice 3 is 6, and 1 that I carry is 7; twice 4 is 8; twice 2 is 4; laſtly, twice 3 is 6, ſo the Product is the ſame as the Dividend, *(viz.)* 648748, ſo of any other.

	5)67480		6)847462		7)894624	
Quotient.	13496		141243-4		127803-3
	8)740067		9)740674		
Quotient	92508-3		82297-1		
	10)74867		12)746000		
Quotient.	7486-7		62166-8		

See the laſt Example whoſe Diviſor is 12, work'd by long *Diviſion*, wherein obſerve the difference of the work.

12)746000(62166 Quotient.
72
26
24
20
12
80
72
80
72
8 Remainder.

So

So the Quotient and Remainder of the preceding Example are the ſame, and in this manner may all the other Examples be proved, whoſe Diviſor is from 1 to 12: for the method of working *Diviſion* the long way, ſee the next Example.

RULE.

Firſt ſeek how often the Diviſor is contained in the Dividend, then having put the Anſwer in the Quotient, multiply the Diviſor thereby, and ſubtract the Product from the Dividend.

Diviſor. Dividend. Quotient.

24)89012(3708
72

170
168

212
192

20 Remains.

Explanation of this Example.

Having placed the numbers as in the work, aſk how oft 24 in 89, or which is better, how oft 2 in 8, and you may ſoon diſcover that 4 times will be too many, for 4 times 2 is 8, and you will have 1 to carry thereto, from the other figure in your Diviſor, therefore place 3 in the Quotient, and multiply the Diviſor thereby, ſaying, 3 times 4 is 12, ſet down 2 under the 9, and carry 1, and ſay, 3 times 2 is 6 and 1 is 7, which I ſet down under the 8, and ſubtract, ſaying, 2 from 9 and there remains 7, 7 from 8 and there remains 1, then bring down the 0, and enquire how oft 2 in 17, which will be but 7 times, becauſe you will have 2 to carry from the other figure of the Diviſor, therefore ſet down 7 in the Quotient and multiply the Diviſor thereby, the Product is 168, which place under 170, then ſubtract, and the remainder is 2, bring down

down the next figure (of the Dividend) 1, and see how oft 24 in 21, anſwer 0 times, place a cypher in the Quotient, and bring down 2, the laſt figure of the Dividend, then ſeek how oft 24 in 212, or how oft 2 in 21, the two firſt figures in the new Dividend, which cannot be 9 times, becauſe 9 times 24 is 216, which you cannot take from 212, ſo you ſee it will be but 8 times, then place 8 in the Quotient, and multiply the Diviſor thereby, and the product will be 192, which place under 212, and ſubtract as before, and there remains 20, which ſet down, and the work is finiſhed, and the Quotient is found to be 3708, and 20 remaining.

This Queſtion is the ſame as if one aſk in 8901 2 half-pence, how many Shillings, the anſwer would be 3708 Shilling, and 20 half-pence, or ten-pence remaining.

N. B. The remainder after every Subtraction is always to be leſs than the Diviſor, otherwiſe the work is wrong and muſt be rectified, by increaſing the laſt found figure in the Quotient, until the remainder be leſs, and you muſt never bring down more than one figure or cypher at a time out of the Dividend, and for every figure or cypher brought down, there muſt be a figure or cypher put in the Quotient.

251	7486746	(299469
	50	25
	248	
	225	1497345
This Example is work'd		598938
in the ſame manner as the	236	
former one, the Quotient	225	7486725
or times the Diviſor 25	117	21 remains.
is contained in the Divi-	100	
dend is 299469, and 21		7486746 Proof.
remains.	174	
	150	
	246	
	225	
	21 remains.	

For

For a PROOF.

See this example where I have multiplied the Quotient by the Divisor, and to that Product have added the remainder, or I might have multiply'd the Quotient by the Divisor, and take in the remainder thus, saying, 5 times 9 is 45, and 1 from the remainder is 46, set down 6 and carry 4; and so proceed through the Quotient, then for the second Multiplier, say, twice 9 is 18, and 2 from the remainder is 20, set down 0 and carry 2, and so of the rest, and if the work is right, the Product will be like the Dividend.

N. B. Let the remainder be as large as it will, you may proceed in the same manner, beginning at the unit figure.

When there is a cypher or cyphers in the Divisor towards the right hand, you may cut it, or them off with a down-right stroke of the Pen, and also do the same with as many figures or cyphers to the right of the Dividend, and then divide the remaining figures of the Dividend, by the remaining figures of the Divisor, as if there had been no cyphers, in the Divisor, or Dividend, and what you cut off from the Dividend is the remainder or part of it; for what remains after the work is done, must be put to what you cut off from the Dividend, for the whole remainder.

4674|00(67486|74(14 Quotient.
4674
20746
18696
205074 Remainder.

574|000) 7487496|748 (13044
574
1747
1722
2549
2296
2536
2296
(240748) Remainder.

You

You may Prove the laſt *EXAMPLE* thus.

574000) 7487496748 (13044
574000

1747496
1722000

2549674
2296000

2536748
2296000

(240748) Remainder.

You may ſee the Quotient and remainder are the ſame as in the firſt Operation.

When the Diviſor, is ſuch a number that any two digits, or numbers in the *Multiplication Table*, being multiplied together do make the Diviſor, then ſuch ſum may be done at two Diviſions, (or by component parts) much ſooner, and in fewer figures than at one: if there happen to be any remainder either in the firſt or ſecond Diviſion, or in both, yet the Quotient will be the ſame. But when there are remainders, the way to find the true remainder, as if you divided at once, is to multiply the firſt Diviſor by the laſt remainder, taking in the firſt remainder, if any be.

Divide 6) 748674674 by 36.

6) 124779112-2

20796518-4-26

N. B. In this Example, the firſt remainder is 2, and the laſt 4, ſo I multiply the firſt Diviſor, which is 6, by the laſt remainder, and take the firſt remainder in, ſaying 4 times 6 is 24, and 2 is 26 the true remainder, as you ſee in the following Proof.

To

To Prove the Last *EXAMPLE.*

```
36) 748674674 (20796518
    72
    ---
    286
    252
    ---
     347
     324
     ---
      234
      216
      ---
       186
       180
       ---
         67
         36
         ---
         314
         288
         ---
          (26)
```

So the Quotient and remainder are the same as in the last Operation.

* Divide 10)74748674 by 40. 9)8748674867 by 45.

```
4) 7474867-4          5)972074985-2
   ---------            ------------
   1868716-34 rem.      194414997-2
   ---------            ------------
```

* *N. B.* I divide by 10 and 4, for 10 x 4 = 40, the Divisor.

In like manner you must proceed with the following Examples, whose Divisor may be produced by the Multiplication of 2 small numbers.

Divide

Divide 10)6749486674 by 50.

5)67494867-4

13498973-24 Rem.

11)7467487 by 55.

5)678862-5

135772-27 Rem.

Divide 10)874867487 by 60.

6)87486748-7

14581124-47 Rem.

11)67481474 by 66.

6)6134679-5

1022446-38 Re.

Divide 12)487467486 by 72.

6)40622290-6

6770381-54 Rem.

10)746248674 by 80.

8)74624867-4

9328108-34 Re.

Divide 11)6748746746 by 88.

8)613522431-5

76690303-82 Rem.

10)6784074867 by 90

9)6784074867-7

75378609-57 re.

Divide 11)874674674 by 99.

9)79515879-5

8835097-71 Rem.

10)6704674487 by 100.

10)67046748-7

6704674-87 Rem.

Divide 11)67467406 by 110.

10) 6133400-6

613340-0-6 Rem.

12)876543214 by 120.

10)73045267-10

7304526-94 Re.

Divide.

Divide 12)67467464 by 132. 12)900000000 by 144

11)5622288-8	12)7500000666-8
511117-20 Rem.	62500055-80 re.

Having explained *Simple Diviſion*, I ſhall give two or three more Queſtions for Exerciſe, and then proceed to *Diviſion* of *Money*, or what is here called *Compound Diviſion*.

Queſtion by Mr. Thomas Sadler, *ſee his Arithmetic, page* 120.

In the *Spectators*, number nine,
Where Eloquence makes Learning ſhine;
Sir Richard Steele, or Addison,
Deſcribe a wond'rous ſet of Men;
A club of Men, exceeding queer,
As fat as bacon Hogs they were.
True brawny Bacchanalian Souls,
Who ſwill in large capacious bowls,
And Bellies mounted to the Chin,
A Hogſhead might be loſt therein:
The fifteen members of this Club,
Whoſe weight when weigh'd by Mr. *Scrub*,
Was juſt three Tons, it was no more,
The weight of each, then pray explore.

15) 60 (4*C*. the weight of each Man.
60
(0)

Bethlehem

BETHLEHEM *Hospital*, whose first Benefactor was SIMON FITZMARY, is in length 540 feet, and in breadth 40 feet, now suppose there are 170 persons provided for at the annual expence of 1000*l.* how much is that a piece.

l. *l.*
17|0)100|0(5
85
150
20
s.
17|0)300,0(17
17
130
119
11
12
d.
17|0)132,0(7
119
13
4
17|0)52|0($\frac{3}{4}$
(10)

540
40
21600 the Area.

When founded, see PROCTOR's *Dictionary* of *Arts* and *Sciences*, or *(viz.)* in 1247.

l. *s.* *d.*
Anf. 5 17 7 $\frac{3}{4}$ $\frac{12}{170}$.

To divide by 10, 100, 1000, *&c.* is no more than to cut of as many figures to the right of the Dividend, as there is cyphers in the Divisor. See this Example.

1|00)6743,84(

Answer. 6743 and 84 Remains.

See

See the Proof of the laſt *EXAMPLE.*

100) 674384 (6743 Anſ. the ſame as before.
600

743
700

438
400

384
300

(84) Remainder.

The Remainder of a Diviſion is 222, the Quotient 496, the Diviſor is 23 more than the ſum of both, what was the Dividend.

222 Remainder.
496 Quotient.

718
23
741 Diviſor. Multiply'd by the Quotient, and 222 the Remainder took in.
496

4448
6671
2966

The Proof of this *Queſtion.*

Diviſor. Dividend.
741)367758(496 *Quot.*
2964

7135
6669

4668
4446

(222) Rem.

Anſ. 367758 = Dividend.

So you ſee the Quotient and Remainder are the ſame as ſpecified in the above Example, and the Diviſor is 23 more than the ſum of both. For 496 Quotient.

222 Remainder.

718 Take
741 From Diviſor.

23 as before.

ſup-

Suppoſe an Army of 40000 Men were to be encamped as follows, *(viz.)* $\frac{1}{2}$ on *Clapham-Common*, $\frac{1}{4}$ at *Hounſlow-Heath*, and $\frac{1}{4}$ at *Brentford*, how many Men muſt there be at each of theſe Places.

2)40000 4)40000 4)40000

Anſ. 20000 *Clapham* 10000 *Hounſlow* 10000 *Brentford.*
——— *Common.* ——— *Heath.* ———

Divide ſeven thouſand, ſeven hundred, ſeventy-ſix ſquare Inches, by one hundred forty-four, being the ſquare Inches in a Foot ſquare, and tell me how many ſquare Feet there are in all.

144)7776(54 Anſwer.

720

576
576

(o)

How much is the twelfth Part of a thirty-ſix Shillings Piece Anſwer. 3 Shillings.

COMPOUND DIVISION.

TEACHETH to divide (by one common Diviſor) either a Simple or Compound number, into any propoſed number of equal Parts, whereof each ſhall be a Compound number.

RULE.

I. Place the Diviſor and Dividend as in Integers.

II. Writing the Quotas under each reſpective Dividend.

III. But if there be a remainder after dividing any of

the denominations, except the leaſt, you muſt find how many of the next lower denominatons it is equal to, by multiplying it by as many of the next leſs, as make one of that, which add to the next, if any, and divide as before.

* *l.*	*s.*	*d.*	‡ *l.*	*s.*	*d.*		*t.*	*s.*	*d.*
2)748	19	6	3)74	15	6 ¼		4)79	17	8 ½
374	9	9	24	18	6 ¼		19	19	5 ½

* To divide the firſt Example, ſay, how oft 2 in 7, which is 3 times and one over, which I call 10 as in whole numbers, and add it to the next figure which makes 14, how oft 2 in 14, 7 times, how oft 2 in 8, is 4 times, then to divide the Shillings I ſay, how oft 2 in 19, which is 9 times, ſet 9 down, and 1 over is 12 pence, and the 6*d.* makes 18*d.* then ſay how oft 2 in 18, 9 times.

N. B. if there had been any odd Pounds, they muſt have been reduced into Shillings, and added to the Shillings, the like is to be obſerved in the reſt.

‡ To divide the ſecond Example, ſay how oft 3 in 7, which is twice, for twice 3 is 6, and 1 over, then how oft 3 in 14, which is 4 times, for 4 times 3 is 12, and 2*l.* over, which is 40 Shillings, when added to the Shillings *(viz.)* 15*s.* makes 55, then how oft 3 in 55, is 18 times, and 1*s.* over, which is 12 Pence, when added to the Pence, *(viz.)* 6*d.* makes 18*d.* then how oft 3 in 18, is 6 times, laſtly, how oft 3 in one Farthing, is 0 times, and the 1 Farthing is over: ſo this Example is the ſame as if you divided 74*l.* 15*s.* 6*d.* ¼ among 3 Men, and Quotes 24*l.* 18*s.* 6*d.* ¼ *per* Man, as *per* Example.

To prove this Example, Multiply the Quotient by the Diviſor, and if the Product is like the Dividend, the work is right.

l.	*s.*	*d.*		*l.*	*s.*	*d.*
5)68	17	4 ½		6)87	17	6 ¼
13	15	5 ½-¼		14	12	11 -½

7)47*l*

l.	*s.*	*d.*
7)47	15	7 ¾
6	16	6 ¼

l.	*s.*	*d.*
8)648	17	4 ¾
81	2	2 - ⅜

l.	*s.*	*d.*
9)674	15	4
74	19	5 ¾ - 1-9*th.*

l.	*s.*	*d.*
10)674	17	7 ¼
67	9	9 - 5/10

l.	*s.*	*d.*
11)748	17	6 ¼
68	1	7 -5-11*th.*

l.	*s.*	*d.*
* 12)746743	19	8 ¼
622281	13	3 ½ - 9/12

* See this Example whose Divisor is 12, work'd the long way, for which observe the difference of the work.

l.	*s.*	*d.*	*l.*	*s.*	*d.*
12)746743	19	8 ¼	(622281	13	3 ½
72					
26					
24					
27					
24					
34					
24					
103					
96					
7					

See the last Example and *Note* that in this and all others of the like kind, you must reduce each remainder into the next inferior denomination, and take in your odd sums, as shillings, pence, farthings, as here you see the remainder of pounds is 7, which I multiply by 20, and take the 19*s.* in, saying, 0 times 7 is 0, but 19 is 19, set down 9 and carry 1; twice 7 is 14 and 1 is 15; and likewise the remainder of shillings is 3, which I multiply by 12, and take in the 8*d.* and so on to the last, but more of this hereafter.

20		
12)159(13	12)44(3	
12	36	
39	8	
36	4	
3	12)33(½	
12	24	
12)44(3	9/12	

This stating carried to the right hand.

When the Divisor exceeds 12, and is such a number that if any two figures in the *Multiplication Table*, being multiplied together will produce it.

RULE.

Divide by it's *Component Parts*, see Page 67 *Simple Division*.

Divide 27*l.* among 28 Men.

l.	*s.*	*d.*
7)27	0	0
4)3	17	1 ½
0	19	3 ¼ Anſ. *per* man.

Divide 45*l.* 12*s.* 8*d.* into 16 equal Parts.

l.	*s.*	*d.*
4)45	12	8
4)11	8	2
2	17	0 ½ Anſ.

24*lb.* of Tea coſt 5*l.* 8*s.* 0*d.* what is that *per lb.*

l.	*s.*	*d.*
8)5	8	0
3)0	13	6
0	4	6 Anſ.

See the ſame Sum in Page 52.

I ſhall add another Example by way of PROOF.

144 Meaſures of Barley coſt 32*l.* 8*s.* what is that *per M.*

12)32	8	0	See the ſame
12)2	14	0	ſum in Page 54 *Compound Multiplication.*
0	4	6	Anſwer.

l.	*s.*	*d.*	
32	8	0	Or See the long way.
20			
s.	*d.*		
144)648(4	6		Anſ. the ſame as in the other Operation.
576			
72			
12			
144)864(6			
864			
(0)			

When

When the Divisor cannot be produced by the multiplication of two small numbers, you must divide as in long Division.

EXAMPLES.

Divide 214*l.* 17*s.* equally among 17 Persons.

l. *s.* *l.* *s.* *d.*
17)214 17(12 12 9 $\frac{5}{17}$ each.
17
44
34
10
20
s.
17)217(12
17
47
34
13
12
d.
17)156(9
153
(3)

Note. In this and all other Examples of the like nature, each remainder is reduced to the next inferior denomination, and each sum whether Shillings, pence or farthings, added thereto.

Divide 100*l.* 4*s.* 6*d.* $\frac{5}{2}$ into 52 Parts.

l. *s.* *d.*
52)100 4 6 $\frac{5}{2}$(1*l.*
52
48
20
s.
52)994(18
52
444
416
28
12
52)342(6
312
30
4
52)122($\frac{2}{52}$
104
18
l. *s.* *d.*
Anf. 1 18 6$\frac{1}{2}$ $\frac{13}{52}$ If

If 49 *Yards* flower'd Silk coſt 74*l.* 14*s.* 6*d.* what coſt 1*yd.*

49(74 14 6(1*f.*
49
25
20
s.
49)514(10
490
24
12
d.
49)294(6
294
0 Anſ. 1*l.* 10*s.* 6*d.*

If 67 *Ells* of Cloth coſt 15*l.* 8*s.* 5*d.* $\frac{3}{4}$ what coſt 1 *E.*

15 8 5 $\frac{3}{4}$
20
s. *d.*
67)308(4 7 $\frac{1}{4}$ Anſ.
268
40
12
d.
67)485(7
469
16
4
67)67($\frac{4}{4}$
67
0

See Page 55 *Compound Multiplication*, for a Proof of theſe two Examples.

REDUCTION.

I. ALL great names are brought into ſmaller of equal value, by Multiplication; that is by multiplying the given number by as many of the next leſſer name, as make one of that greater; as Pounds into Shillings, Pence, or Farthings; or Tons weight into Pounds weight, *&c. &c.*

II. All ſmall names are brought into greater, of equal value, by Diviſion; that is, by dividing the given number by

by as many of the leſſer, as makes one of the next greater name; as Farthings into Pence Shillings, or Pounds; or Pounds weight into Quarters, Hundreds, or Tons weight: alſo, Grains into Penny-weights, &c. Nails into Ells, Yards, &c. &c.

* In 463*l.* how many Shillings.

463
20

9260 Anſ.

In 9260 Shillings how many Pounds.

2|0)926|0

£. 463 Anſ.

* To work the firſt Example, and all others of the like kind, you muſt multiply by each next inferior denomination, from the given one to that ſought.

And to prove them by Reduction aſcending you muſt begin with the loweſt denomination, and divide by the numbers they were multiply'd by

See the firſt and ſecond Examples.

In 865 Shillings, how many Pence.

865 Shil.
12

*10380 Anſ.

* In 10380 Pence how many Shillings.

12)10380

865 Anſ.

In 45*l.* how many Pence.

45
20

900
12

§ 10800 Anſ.

§ In 10800*d.* how many £.

12)10800

2|0)90|0

£. 45 Anſ.

* In 7346*l.* how many Farthings.

7346 £.	
20	
146920	
12	
1763040	
4	
*7052160 Anſ.	

* In 7052160 Farthings how many Pounds.

4)7052160	
12)1763040	
2|0)14692|0	
£. 7346 Anſ.	

* *N. B.* This Example is required to be reduced from Pounds to Farthings, therefore you muſt multiply by 20 to bring it in Shillings, and then by 12 for Pence, laſtly, by 4 for Farthings, which are 7052160, which to bring into Pounds, you muſt begin with the loweſt denomination, and divide by the ſame numbers you multiply'd by, ſo it proves your work.

§ In 7486*l.* how many Half-pence.

7486 £.	
20	
149720	
12	
1796640	
2	
§ 3593280 Anſ.	

§ In 3593280 Half-pence, how many Pounds.

2)3593280	
12)1796640	
2|0)14972|0	
£. 7486 Anſ.	

In

In 594 Pounds, how many Six-pences.

594 £.	
20	
11880	594
2	40
23760 Anſ.	23760 the ſame as before.

N. B. This Example might have been multiply'd by 40, the Six-pences in one Pound, ſee the work on the right hand this Example.

In 23760 Six-pences, how many Pounds.

2)23760	Or thus.
2|0)1188|0	4|0)2376|0
£. 594 Anſ.	£. 594 Anſ.

This Example might have been divided by 40, the Six-pences in one Pound, ſee the work on the right hand the Example.

When the Sum to be reduced conſiſts of ſeveral denominations, as Pounds, Shillings, Pence, *&c.* or Tons, Hundreds, Quarters, Pounds, *&c.* then you muſt multiply as before; but you muſt take in the Shillings, Pence, or Farthings, that ſtand in each denomination, as you reduce the higer name to the next inferior.

In 40*l.* 16*s.* 8*d.* ½ how many Half-pence.

£. 40 16 8 ½	In this Example you multiply the Pence by 2, to bring it into Half-pence & take the half-penny in.
20	
816	
12	
9800	
2	
*19601 Anſ.	

* In 19601 Half-pence, how many Pounds.

2)19601	
12)9800 — ½	
2|0)81|6 —8	
Anſ. 40 16 8 ½	

Here you divide the half-pence by 2 to bring it into Pence, *&c.*

In 748*l.* 16*s.* 6*d.* how many Two-pences.

£.	748	16	6
	20		
	14976		
	6		
*	89859 Anſ.		

Note. As 6 two-pences are 1 Shilling you multiply by 6 for Anſwer.

* In 89859 Two-pences, how many Pounds.

‡ 6)89859

2|0)1497|6 — 6

£. 748 16 6 Anſ.

‡ As 6 two-pences are 1*s.* you divide by 6 for Shillings.

In 6740*l.* how many Groats.

6740 £.
20
134800
3 Groats 1*s.*
§ 404400 Anſ.

§ In 404400 Groats how many Pounds.

3)404400

2|0)13480|0

£. 6740 Anſ.

There are 12 Purſes with each 12 Guineas, how much Sterling is the Sum.

l.	*s.*	
12	12	
	12	Purſes.
£. 151	4	Anſ.

Suppoſe

Suppose 6 Ingots, each in value 18 Guineas, were carried to the Mint, to be coined into Five-and-threepences, Quere the number.

l.	*s.*	
18	18	
	6	the number of Ingots.
113	8	
20		
2268		
12		
* 9)27216		
7)3024		
432		Answer.

s.	*d.*
5	3
12	
63	

* Here I divide by 9 and 7 the Ratio of 63.

A select *Alphabetical Table* of *Foreign Coins.*

Names.	Value Sterling.	Country.
ABASHEE,	16 Pence,	*Persia.*
Asar.	6*s.* 8*d.*	*Persia.*
Asper,	3 Farthings,	*Turkey.*
Crusadoe,	6*s* 2*d.*	*Germany.*
A Dollar,	4*s.* 6*d.*	*Italy.*
A Lyon Dollar,	4 Shillings,	*Aleppo.*
A Gross Dollar,	4*s.* 2*d.*	*Holland.*
A Specie Dollar,	5 Shillings,	*Holland.*
A *Zealand* Dollar,	3 Shillings,	*Holland.*
Old *Phillip's* Dollar,	5 Shillings,	*Holland.*
Leopold's Dollar,	4*s.* 3*d.*	*Holland.*
Rodolphus's Dollar,	4*s.* 4*d.*	*Holland.*
Prince of *Orange's* Dollar,	4*s.* 4*d.*	*Holland.*
A Ducat,	4*s.* 8*d.*	*Hungary.*
A Ducat,	5*s.* 3*d.*	*Poland.*
A Ducatoon,	6*s.* 3*d.* $\frac{3}{4}$	*Holland.*
Piece of Eight in common,	4*s.* 6*d.*	*Spain.*
Guildar.	3*s.* 8*d.*	*Germany.*

In 262*l.* 4*s.* 6*d.* Sterling, how many Dollars at 4*s.* 3*d.* each.

s.	*d.*	*l.*	*s.*	*d.*
4	3	262	4	6
12		20		
51		5244		
		12		

Divisor. 51)62934(1234
51
Ans. 1234.
119
162
173
153
204
204
0

Or the same sum may be worked thus.

s.	*d.*	*l.*	*s.*	*d.*
4	3	262	4	6
4		20		
17		5244		
		4 the three-pences.		

17)20978(1234
17
Ans. 1234.
39 the same as
34 before.
57
51
68
68
0

Or

Or the same sum may be work'd thus.

s.	d.
4	3
8	
34	

l.	s.	d.
262	4	6
20		
5244		
8 three half-pences.		

34)41956(1234
34
79
68
115
102
136
136
0

Answer. 1234. the same as before.

Or the same sum may be work'd thus.

s.	d.
4	3
12	
51	
4	
204	

l.	s.	d.
262	4	6
20		
5244		
12		
62934		
4		
251736		

204)251736(1234
204
477
408
693
612
816
816
0

Answer. 1234. the same as before.

In

In 746 *Marks*, at 13*s.* 4*d.* *per M.* how many Pounds.

		s.	d.
746	Marks,	13	4
160	Pence,	12.	

12)119360 — 160

4|0)994|6 — 8

Anſ. 497 6 8

In 497*l.* 6*s.* 8*d.* how many *Marks*, at 13*s.* 4*d.* *per M.*

l.	s.	d.	s.	d.
497	6	8	13	4
20			12	
9946			160.	
12				

16|0)119360(746.
112

73
64

Anſ. 746.

96
96 The Proof of the other Example,

0

In 1546 Pieces of Eight at 4*s.* 6*d.* *per* Piece, how many Pounds Sterling.

	s.	d.
1546	4	6
54	12	
6184	54	
7730		

12)83484

2|0)695|7

*£. 347 17 Anſ.

Proof of this Example

* £. 347	17		4	6
	20		12	
	6957		54	
	12.			

54)83484(1546
54

294
270

248 Anſ. 1546. the
216 ſame as before.

324
324

0

When

When any ſum of Money, or any weight, or Meaſure, is to be brought into another ſum of a different denomination, then always remember that before you divide, you make the Diviſor and Dividend of the ſame name, that is, if the Dividend be Pounds, Pence, Yards, Shillings, &c. your Diviſor muſt always be of the ſame name.

In 324 Moidores, how many Pounds.

```
        324
         27 Shillings 1 Moidore.
       ----
       2268
       648
      -----
  2|0)8|874
      -----
£.    437   8 Anſ.
      -----
```

A Merchant at LONDON, delivers to his Correſpondent, as much broad Cloth as comes to 547*l.* 14*s.* 7*d.* and he receives the ſame in Croſs Dollars at 4*s.* 2*d.* each, how many muſt he receive.

```
 s.  d.        l.   s.  d.
  4   2       547   14   7
 12            20
 --          -----
 50          10954
                12
            -----
      5|0)13145|5
          -------
£.          2629   5
          -------
```

How

How many Cruſadoes at 6*s.* 2*d.* each, muſt be paid for 1000 Guilders of *Noremberg*, at 7*s.* 1*d.* each.

s.	*d.*			*s.*	*d.*
6	2			7	1
12				12	
74		5000		85	
		8000			

74)85000(1148
74
Anſ. 1148.
110 and 48*d.* over.
360
296
640
592
48

How many Rix Dollars at 4*s.* 3*d.* $\frac{1}{4}$ each, may I receive for 1750*l.* 15*s.* 6*d.* $\frac{1}{2}$ Sterling.

s.	*d.*			*l.*	*s.*	*d.*
4	3	$\frac{1}{4}$		1750	15	$6\frac{1}{2}$
12				20		
51				35015		
4				12		
205				420186		
				4		

205)1680746(8198
1640
Anſ.
407 8198. &
205 3*s.* 3*d.*
over.
2024
1845
1796
1640
4)156
12)39
s. 3 3*d.*

In

In 276 Crusadoes at 6*s*. 2*d*. each, how many *Hungarian* Ducats at 4*s*. 8*d*. each

s.	*d*.		*s*.	*d*.
4	8	276	6	2
12		74	12	
56		1104	74	
		1932		

56)20424(364 Anf.
168
362
336
264
224
40

and 40*d*. over, or 3*s*. 4*d*.

In 347*l*. 11*s*. 5*d*. how many *French* Crowns at 4*s*. 6*d*. $\frac{1}{8}$ each.

s.	*d*.		*l*.	*s*.	*d*.
4	6 $\frac{1}{8}$	347	11	5	
12		20			
54		6951			
8		12			
433		83417			
		8			

433)667336(1541
433
2343
2165
1783
1732
516
433
83

Anf. 1541, & 10*d*. $\frac{3}{8}$ over.

8)83

10 $\frac{3}{8}$

A Merchant sends to his Correspondent as much Corn as comes to 1575*l*. to receive the same in Ducatoons, at 6*s*. 3*d*. $\frac{1}{2}$ each, how many ought he to receive.

s.	*d*.		*l*.	
6	3 $\frac{1}{2}$		1575	
12			20	
75			31500	
5			12	
378			378000	
			5	

378)1890000(5000
1890
000

Anf. 5000. Ducatoons.

A

A General of an Army consisting of 5000 men, in a very sharp engagement lost 2380 Men, but coming off victorious, he for there valiant behaviour gave 1000 Guineas, to be equally divided among them, and the remainder (if any) to be given to a little errand boy, how much did each receive.

5000 Soldiers.
2380 Killed.

2620.

Guineas.
1000
21 Shillings in a Guinea.

1000
2000

21000 Shillings.
12

252000
4

262|0)100800|0(384
786

2220
2096

1240
1048

4)192
12)48

4

12)96
8

Anf. 8s. per Man, and 4s. for Boy.

Remainder divided by 4 &c
12 Quotes 4s. for Boy.

How

How many Shillings, 6*ds.* 4*ds.* 3*ds* 2*ds.* 1*ds.* ½. & ¼. of each a like number, will discharge a debt of 335*l.* 8*s.* 4*d.*

d.	
12	Here I add all the sums
6	mentioned into one, which
4	make 28*d.* ¾, which x by 4
3	produces 115 Farthings,
2	then reduce the debt into
1	the same name, and divide
½	it by the Farthings contain-
¼	ed in the seperate pieces,
	(viz.) 115, Quotes 2800
28 ¾	pieces of each sort. See
4	the work,
115	

l.	*s.*	*d.*	
335	8	4	
20			
6708			
12			
80500			
4			
115)322000(2800			
230			Pieces of each sort.
920			
920			
00			

TROY *WEIGHT.*

In 36 Pounds how many Grains.

36 *lb.*
12 *oz.* in 1*lb.*
432
20 *dwt.* in 1 *oz.*
8640
24 *grs.* in 1 *dwt.*
34560
17280
207360

* In 207360 Grains, how many Pounds.

6)207360
4)34560
2[0)864|0
12)432
36 Anſ.

* *N. B.*

* *N. B.* The Grains in the laſt example are divided by 4 and 6 = 24, in order to abbreviate the work, and in all ſuch caſes *i e.* when any Diviſor conſiſts of ſuch a number, that two ſmall numbers multiply'd together will produce it, it will be much better to divide by thoſe numbers, and proceed with the remainders (if any be) as directed in Page 67.

If a Silver Tankard weigh 1*lb.* 8*oz.* 14*dwt.* 21*gr.* what is the content or weight thereof in Grains.

lb.	*oz.*	*dwt.*	*gr.*
1	8	14	21
12 Ounces.			
20			
20 Penny weights.			
414			
24 Grains.			
1677			
828			
9957 Anſ.			

How many Porringers, each 11*oz.* are in 19*lb.* 10*oz.* 11*dwt.* 5*gr.* of Silver.

lb.	*oz.*	*dwt.*	*gr.*
19	10	11	5
12 oz.		*oz.*	
		11	
238		20 dwt.	
20 dwt.			
		220	
4771		24 gr.	
24 gr.			
		880	
19089		440	
9542			
		5280	

5280)114509(21 Anſ.
10560

8909
5280

2629 Remains.

Avoirdupois

Avoirdupois *WEIGHT.*

In 24*C.* 3*qr.* 26*lb.* how many Pounds. Or thus.

C.	*qr.*	*lb.*
24	3	26
4 *qr.* make 1*C.*		
99		
28 *lb.* make 1*qr.*		
798		
200		
2798	Anſ. *lb*	

112 *lb.* 1 *Cwt.*	
24 *No.* of hundreds.	
448	
224	
2688	
110	The odd weight.
lb. 2798	Anſwer.

A quicker way, Hundreds, Quarters, and Pounds, may be ſpeedily reduced into Pounds thus; ſet down the groſs Hundreds, four ſeveral times in the form following, and take in the odd weight as below.

	C.	*qr.*	*lb.*
In	24	3	26
	24		
	24		
	24		
	110 odd weight.		
Anſ.	2798 *lb.* as above.		

Another

Another EXAMPLE.

C, *qr*. *lb*.
In 216 2 19 how many Pounds.
4 *qrs*. make 1*C*.

866
28 *lb*. 1*qr*.

6937
1733

Anf. 24267 *lb*.

See the short way.

C. *qr*. *lb*.
In 216 2 19
216
216
21675

Anf. 24267 and Proof.

In 10*T*. 12*C*. 2*qr*. 14*lb*. 10*oz*. 14*dr*. how many Drams.

T. *C*. *qr*. *lb*. *oz*. *dr*.
10 12 2 14 10 14
20 *C*. in 1 Ton.

212
4 *qr*. in 1*C*.

850
28 *lb*. in 1*qr*.

6814
1700

23814
16 *oz*. in 1*lb*.

381034
16 *dr*. in 1*oz*.

6096558 Anf.

In 6096558 Drams, how many Tuns.

4)6096558

4)1524139-2

4)381034—14

4(95258-2

7)23814—10

4)3402

4)850—14

2|0)21|2—2

Anf. 10 12 2 14 10 14

Proof of the other.

A

A Company of Soldiers conſiſting of 42 Men, took 754*lb.* 4*oz.* 8*dr.* of run Tea, which their Officers agreed ſhould be equally divided amongſt them, what Quantity ought each Man to ſhare.

lb.	*oz.*	*dr*	*lb.*	*oz.*	*dr.*	
42)754	4	8(	17	15	5	Anſ.
42						
334						
294						
40						
16						
42)644(	15*oz.*					
42						
224						
210						
14						
16						
42)232(	5*dr.*					
210						
22						

Or thus

lb.	*oz.*	*dr.*
7)754	4	8
6)107	12	1-1
Anſ. 17	15	5—22

The Proof of the other.

In this laſt Operation I have divided the Quantity of Tea by 7 and 6, for 7 x 6 = 42, the number of Men.

Long

LONG *MEASURE.*

In 1 Mile, how many Barley Corns,

1 Mile
8 *Fur.* in 1 *M.*

8 *Furlongs.*
40 *Pls.* in 1 *Fur.*

320 *Poles.*
11 ½ *Yds.* 1 *Pl.*

2)3520

1760 *Yards.*
3 *Feet* in 1 *Yd.*

5280 *Feet.*
12 *Inches* in 1 *F.*

63360 *Inches.*
3 *B. C.* 1 *In.*

Anſ. 190080 *Barley Corns.*

How many Barley Corns will reach from *Newcaſtle*-under-*Lyme*, to *London*, which is 149 meaſured Miles.

149 *Miles.*
1760 *Yds.* in 1 *Mile.*

8940
1043
149

262240 *Yards.*
3 *Feet* in 1 *Yard.*

786720 *Feet.*
12 *Inches* in 1 *Foot.*

9440640 *Inches.*
3 *B. C.* 1 *Inch.*

28321920 *Barley Corns.*

In

In the laſt EXAMPLE you may proceed thus.

190080 *Barley Corns* in 1 *Mile.*
Multiply'd by 149 the number of *Miles.*

1710720
760320
190080

Produces 28321920 *Barley Corns.* As in the laſt Operation.

In 50 Miles how many Barley Corns.

50
1760

3000
350
50

88000
3 *Feet* 1 *Yd.*

264000
12

3168000
3

Anſ. 9504000

Or thus.

* 190080
50

9504000 Anſwer.

* So multiplying 190080 the Barley Corns in 1 Mile, by the number of Miles, produces the ſame Anſwer, and is a Proof of the other Example.

The Circumferance of the Earth, as all other Circles is divided into 360 Degrees, and every Degree into 60 *English* Miles; I demand how many Miles, Yards, Feet, Inches, and Barley Corns, will reach round the whole Sphere.

360 *Degrees.*
60 *Eng. Miles.*

21600 *Miles.*
1760 *Yards* in 1 *Mile.*

1296000
151200
21600

38016000 *Yards.*
3

114048000 *Feet.*
12

1368576000 *Inches.*
3

4105728000 Anf.

Or thus.

Barley C. 190080 in 1 *Mile.*
Miles 21600 round the Earth.

114048000
190080
380160

4105728000

Proof of the other.

Or the famous Mr. *Norwood* calculates thus, 25020 Miles round the Globe.

Then 190080 the *Barley Corns* in one *Mile.*
x by the *Miles* 25020 round the Earth.

3801600
9504000
380160

4755801600
4105728000

Difference 650073600

So the difference of *Barley Corns* is 650073600 which is 3420 Miles.

3420 difference.
21600 add.

25020 Proof.

A Degree

A Degree is said to be 60 Miles, according to custom, but it has been experienced by several, that a degree contains 69½ Miles: It is required to find the difference in Feet.

1760	*Yards* 1 *Mile.*
60	
105600	*Yards.*
3	*Feet* 1 *Yard.*
316800	*Feet.*

1760	*Yards* 1 Mile.
69½	
15840	
10560	
121440	
880	½ *the No.* of *Yds.* in 1 *Mile.*
122320	*Yards.*
3	*Feet* 1 *Yard.*
366960	
subtra& 316800	Product of the 1*st.* Multiplication.
Feet 50160	Answer.

Admit the hindermost Wheel of a Coach, or other Carriage to be 5½ Yards in circumference; how many times will it turn round in going between *Newcastle-under-Lyme* and *London*, which is 149 Measured Miles.

149	*Miles.*
1760	*Yards* 1 *Mile.*
8940	
1043	
149	
262240	
2	*Half-Yards.*
11)524480	
47680	Answer.

In this Example you multiply the Miles between *Newcastle* & *London*, by 1760 the Yards in a Mile, which produces 262240 Yards, then x by 2 for half Yards, produces 524480, which divided by the number of half Yards round the Wheel, *(viz.)* 11, Quotes 47680 the Answer.

TIME.

To know how many Days are in each Month.

Thirty Days hath *September*,
April, *June*, and *November*,
All the reſt hath Thirty-one,
Save *February*, which alone
Has 28; but one Day more
Is added to't * one Year in four.

This being omitted in the *Tables* in *Addition*, I thought proper to inſert it here,

* *Leap Year.*

N. B. This *Table* is made uſe of in *Aſtronomical* and *Cronological* Calculations.

In 1 Year how many Hours, Minutes, and Seconds, accounting 365 Days 6 Hours to the Year.

Days.	*Hours.*	Or accounting only 365 Days.
365	6	365
24	*Hours* 1 *Day.*	24
1466		1460
730		730
8766	*Hours.*	8760 *Hours.*
60	*Minutes* 1 *Hour.*	60
525960	*Minutes.*	525600 *Minutes.*
60	*Seconds* 1 *Minute.*	60
31557600	*Seconds.*	31536000 *Seconds.*

A Century is 100 Years; An Indiction among the *Romans*, a Revolution of 15 Years.

In

In 36 Years, how many Hours, Minutes & Seconds, accounting 365 Days in the Year.

36 *Years.*
365 *Days* 1 *Year.*

180
216
108

13140 *Days.*
24 *Hours* 1 *Day.*

52560
26280

315360 *Hours.*
60 *Min.* 1 *Hour.*

18921600 *Minutes.*
60 *Sec.* 1 *Min.*

1135296000 *Seconds.*

How many Days, Hours, Minutes and Seconds, are elapsed, since the Birth of our bleſſed *Lord* and *Saviour Jeſus Chriſt*, ſuppoſing it 1775 Years ago, and allowing 365 Days to a Year.

1775
365 *Days* 1 *Year.*

8875
10650
5325

647875
24 *Hours* 1 *Day.*

2591500
1295750

15549000 *Hours.*
60 *Min.* 1 *Hour.*

932940000 *Minutes.*
60 *Sec.* 1 *Min.*

55976400000 *Seconds.*

MOTION.

60 Seconds
60 Minutes
3 oDegrees
12 Signs

is

1 Minutes,
1 Degree,
1 Sign,
1 Revolution of the whole Sphere, or 360 Degrees.

In half a Years time the Sun makes it's progreſs through 6 Signs in the Zodiac, how many Degrees, Minutes, and Seconds, doth that amount to.

6 *Signs.*
30 *Degrees* 1 *Sign.*

180 *Degrees.*
60 *Minutes* 1 *Degree.*

10800 *Minutes.*
60 *Seconds* 1 *Minute.*

648000 *Seconds.*

The Single *RULE* of *THREE*, DIRECT.

THIS Rule teacheth by three numbers, known how to find a fourth unknown, in a direct proportion, that is, as the 1*ſt.* is to the 2*d.* ſo is the 3*d.* to the 4*th.*

RULE.

You muſt bring your 1*ſt.* and 3*d.* number into one name, or denomination, and the middle number into the loweſt Term mentioned, then multiply the 2*d.* and 3*d.* numbers together, and that Product divided by the 1*ſt.* and look of what value you left your Middle number, of the ſame value ſhall you find your Quotient,

Before I begin to work any Examples, it will be neceſſary to obſerve the following Directions,

Firſt

First observe that the *1st.* and *4th.* numbers are called extremes, and the *2d.* and *3d.* means, the Product of the extreams, is equal to the Product of the means, when the *1st.* Term gives or requires the *2d.* we ask what does the *3d.* Term give or require also, if more be required, it will be best (according to Mr. *Emmerson's* excellent method) to mark the lesser extreme, if less be required to mark the greater extreme, for a Divisor, then multiply the 2 other numbers together, and divide by this Divisor the Quotient is the Anſ. in the same denomination as the *2d.* Term.

In stating your Question, you must remember that the demand, or the whole number which moves the Question, must always be in the third place, and the first number must be of the same name, or so reduced.

If *1lb.* of Sugar cost *4d.* what cost *96lb.*

lb. d. lb.
If 1—4—96
4
[12)384
2|0)3|2

Anſ. 1—12 or *3s.*

See the first Example work'd by *Compound Multiplication.*

d.
4
12
4 0
8
Anſ. 1 12 0 as before.

If *1lb.* of Sugar cost *6d.* what cost *1Cwt.*

lb. d. lb.
If 1—6—112 = *1Cwt.*
6
12)672
2|0)5|6

Anſ. 2—16 or *5s.*

The same Example prov'd by *Compound Division.*

£. 1 12
20
32
12
12)384
8)32

Anſ. *4d.* same as before.

The last Examples plainly shew the extensive use of *Compound Multiplication* and *Division*, and how much preferable in some cases they are to the *Rule* of *Three*, by solving Questions in a far more concise manner, so it is very necessary to be acquainted with those useful Rules, namely *Compound Multiplication* and *Division*.

* If 3 ounces of Silver cost 17*s*. what cost 48 Ounces, at the same rate.

If 3 Pounds of Ginger cost 3*s*. what cost 26*lb*. at the same rate.

oz. *s.* *oz.*	*lb.* *s.* *lb.*
If 3—17—48	If 3—3—26
17	3
3)816	3)78
2|0)27|2	2|0)2|6
£. 13-12 Ans.	£. 1-6

* It is very plain that the demand lies upon 48, which must be the third number, and as the first number must always be of the same name with the third, so 3 here must be the first number, and then the other number *(viz.)* 17, is of the same name with the Answer required, and must be the middle number; and as 48*oz*. will cost more than 3, it is plain that 3 the lesser extreme must be the Divisor, then multiply the second and third numbers together and divide by the first, the Quotient will be Shillings, which reduce into Pounds.

If

If 1*lb.* of Tea coſt 4*s.* 6*d.* what coſt 112 Pounds.

lb.	*s.*	*d.*	*lb.*
If 1	—4	6	—112
	12		54
	54		448
			560
		12)6048	
		2|0)504	
		£. 25-4 Anſ.	

If 1 Gallon of Ale coſt 14*d.* what coſt 36 Gallons, at the ſame rate.

gl.	*d.*	*gal.*
If 1	—14	—36
		14
	12)504	
	2|0)42	
	£. 2-2 Anſ.	

N. B. When the firſt Term is unity or 1, reduce the ſecond Term into whatever name you ſee convenient, which multiply'd by the third will give the Anſwer accordingly, which reduce as may be required.

If 2*oz.* of Silk coſt 2*s.* 6*d.* what coſt 7*lb.* at the ſame rate.

oz.	*s.*	*d.*	*lb.*
If 2	—2	6	—7
	12		16
	30		112
			30
		2)3360	
		12)1680	
		2|0)140	
		£. 7-0 Anſ.	

If 1 Pound of Coffee coſt 7*s.* 6*d.* what coſt 90*lb.*

lb.	*s.*	*d.*	*lb.*
If 1	—7	6	—90
	12		90
	90	12)8100	
		2|0)675	
		£. 33-15 Anſ.	

If one Pair of Stockings coſt 2*s*. 3*d*. what coſt 19*doz*. Pair, at the ſame rate.

Pr.	*s.*	*d.*	*doz.*
If 1	2	3	19
	12		12
	27		228 Pair.
			27
			1596
			456
			12)6156
			2|0)51|3
			£. 25-13 Anſ.

Bought a Firkin of Butter containing 56*lb*. for 18*s*. 8*d*. what is that *per* Pound.

lb.	*s.*	*d.*	*lb.*
If 56	18	8	1
	12		
	224		56)224(4*d*. Anſ.
			224
			0

Sold 3*C*. weight of Tobacco, at 18*d*. *per* Pound, what is the Price of the whole.

lb.	*d.*	*C.*
If 1	18	3
		333
		336
		18
		12)6048
		2|0(50|4
		£. 25-4 Anſ.

Now take the reverſe of this example which proves the work, & ſay, If 3*Cwt*. of Tobacco coſt 25*l*. 4*s*. how much is that *per lb*.

C.	*l.*	*s.*	*lb.*
If 3	25	4	1
333	20		
336	504		
	12		
	336)6048(18*d*. Anſ.		
	336 the proof of the other		
	2688		
	2688		
	0		

If 1*lb*.

If 1 Pound of Sugar coſt 9*d*. what coſt 17*C*. 2*qr*. at the ſame rate.

lb.	*d*.	*C*.	*qr*.
If 1	9	17	2
		17	
		17	
		1756	
		1960	
		9	middle number.
		12)17640	
		2|0)147|0	
		£. 73-10	Anſ.

Or you might have brought 17*C*. 2*qr*. into *lb*. thus.

17	2
4	
70	
28	
560	
140	
1960	the ſame.

Note, As multiplying or dividing by 1 neither augments the *Multiplicand*, nor decreaſeth the *Dividend*, ſo there is no occaſion to divide by the firſt Term in this Example, it being an Uuit.

If 17*C*. 2*qr*. of Sugar coſt 73*l*. 10*s*. what coſt 1 Pound at the ſame rate.

C.	*qr*.	*l*.	*s*.	*lb*.
* If 17	2	73	10	1
17		20		
17				
1756		1470		
		12		
1960				
		1960)17640(9*d*.	Anſ.	the Proof
		17640		of the above.
		0		

* To bring Hundreds, Quarters, and Pounds, into Pounds, proceed as has been ſhewn in *Reduction*.

If 1*lb.* of Tobacco coſt 15*d.* what coſt 3 Hogſheads, weighing together 15*C.* 1*qr.* 19*lb.*

Now take the reverſe of this Example which proves the work, & ſay, Suppoſe 3*hhds.* of Tobacco, weighing together 15*C.* 1*qr.* 19*lb.* were ſold for 107*l.* 18*s.* 9*d.* how is it rated *per* Pound.

lb.	*d.*	*C.*	*qr.*	*lb.*
If 1	15	15	1	19
		15		
		15		
		1547		
		1727		
		15		
		12)25905		
		2|0)215|8-9		
		£. 107-18-9 Anſ.		

C.	*qr.*	*lb.*	*l.*	*s.*	*d.*	*lb.*
If 15	1	19	107	18	9	1
15			20			
15						
1547			2158			
1727			12			
			1727)25905(15*d.* Anſ.			
			1727 the Proof			
			of the other			
			8635			
			8635			
			0			

If 1*yd.* of Cloth is worth 14*s.* what is the worth of 5 Pieces, each Piece 19 Yards.

Yds.	*s.*	*Yds.*	
If 1	14	95	19 *Yards.*
		14	5 *Pieces.*
		2|0)133|0	95 *Yards.*
		£. 66-10 Anſ.	

If an Ell of Holland coſt 4*s.* 6*d.* what is the value of 5 Pieces, each 12 Ells.

E.	*s.*	*d.*	*E.*	
If 1	4	6	60	12 *Ells.*
	12		54	5 *Pieces*
	54		240	60 *Ells.*
			300	
			12)3240	
			2|0)27|0	
			£. 13-10 Anſ.	

If a

If a Mans Yearly income be 300*l.* how much is that *per* Day.

days *l.* *day.*
If 365—300—1
20
——— *s.* *d.*
365)6000(16 5 $\frac{1}{4}$ Anſ.
365
———
2350
2190
———
160
12
——— *d.*
365)1920(5
1825
———
95
4
———
365)380($\frac{4}{365}$
365
———
$\frac{15}{365}$
———

If I ſpend 7*d.* *per* Day, what is that *per* Year.

day. *d.* *days.*
If 1—7—365
7
———
12)2555
———
2|0)21|2-11
———
£. 10-12-11 Anſ.
———

If a Pint

If a Pint of Wine coſt 10*d.* what coſt 3*hhds.* at the ſame rate.

Pint. d. hhds.
If 1—10—3
63 *Galls.* 1 *hhd.*
189 *Gallons.*
4 *Quarts* 1 *Gal.*
756 *Quarts.*
2 *Pints* 1 *Quart.*
1512 *Pints.*
10 *middle number.*
12)15120
2|0)126|0
£. 63—0

A Merchant bought 4 pieces of Holland, each 12 Ells for 7*l.* 10*s.* what did 1 Ell coſt.

Ells. l. s. Ell. 12 Ells.
If 48—7 10—1 4 *pieces*
20 48 *Ells.*
s. d.
48)150(3 1½ Anſ.
144
6
12
48)72(1
48
24
4
48)96(½
96

A Grocer bought 3 *Hhds.* of Sugar, each weighing Groſs 10*C.* 3*qr.* 12*lb.* Tare *per hhd.* 26*lb.* at 2*d.* ½ *per* Pound, I demand what the 3 *hhds.* came to.

C. qr. lb.
10 3 12
10
10
1096
1216
3 *Hhds.*
3648
78 *whole Tare*, ſubtract from whole *Groſs weight.*
3570 *Neat Weight.*

lb.
26 *Tare per hhd.*
3 *Hhds.*
78 *whole Tare.*

Then ſay.
lb. d. lb.
If 1—2 ½—3570
4 10
10 4)35700
12)8925
2|0)74|3-9
£. 37-3-9 Anſ.

N. B.

N. B. By reaſoning and a little conſideration, it may be eaſily known how to ſtate any Queſtion, for the demanding Sum or Quantity, muſt always be the third number, which muſt be of the ſame denomination as the firſt, whether Money, Weight, *&c.*

If a Merchant hath owing him 1000*l.* and his Debtor doth agree to pay him for every Pound, 12*s.* 6*d.* I demand how much he muſt pay in all.

l.	*s*	*d.*	*l.*
If 1	12	6	1000
	12		150
150	12)150000	6*ds.*	
	2|0)1250|0		
	£. 625-0 Anſ.		

Or thus.

If 1	12	6	1000
	2	6*ds.*	25 6*ds.*
25	5000		
	2000		
6*ds.* in 1*l.* 4|0)2500|0			
	£. 625-0 Anſ.		

Or thus.

l.	*s.*	*d.*	*l.*
If 1	12	6	1000
	6		75 Two-pences.
75	5000		
	7000		
Two-pences in 1 Shil.	6)75000		
	2|0)2150|0		
	£. 625-0 Anſ.		

N. B.

N. B. If the ſum he paid *(viz.)* 625*l.* had been given, and the rate he paid *per* Pound, to find the whole Debt, the Queſtion muſt be ſtated thus.

s.	*d.*	*l.*	*l.*
If 12	6—	1—	625
12			20
150			12500
			12

15|0)15000|0

£. 1000 Anſ. The whole Debt.

And if the Debt and Sum paid were given, to find the rate, the Queſtion muſt be ſtated thus.

If 1000—625—1
20

1|000)12|500
12

6|000 Anſ 12*s.*6*d.*

Or thus.

If 1000—625—1
20

1000)12500(12*s.* 6*d.* Anſ
12000 the ſame as
the other.
500
12

1000)6000(6
6000

0

If a

If a Gentleman has an Eſtate of 245*l.* 10*s.* a Year, how much muſt he ſpend one day with another, to lay up 60 Guineas at the Years end.

	l.	*s.*
Eſtate of	245	10
Required to lay up	63	0
£.	182	10

days.	*l.*	*s.*	*day.*
If 365	182	10	1

20

s.

365)3650(10 Anſ. 10 *per* Day.
365

0

If 17*C.* 3*qr.* 17*lb.* of Tobacco coſt 133*l.* 13*s.* 4*d.* what coſt 1 Ounce.

C.	*qr.*	*lb.*
If 17	3	17
17		
17		
17		
101		
2005		
16 *oz.*	1*lb.*	
32080		

l.	*s.*	*d.*	*oz.*
133	13	4	1

20

2673

12

32080)32080(1*d.* Anſ. *per oz.*
32080

0

If

If 1 *Cwt.* of Lead coſt 15*s.* 11*d.* what coſt 5 Fother, each Fother containing 19 *C.* $\frac{1}{2}$ at that rate.

halves	*s.*	*d.*	*C.*	
If 2	15	11	19	$\frac{1}{2}$
	12		5	
	191		97	$\frac{1}{2}$

Multiply'd by 2 and take 1 in.

195
191

195
1755
195

2)37245

12)18622-$\frac{1}{2}$

2|0)155|1-10

£. 77-11-10

At a Noble a Week, how many Months Board may I have for 50*l.*

s.	*d.*	*w.*	*l.*
If 6	8	1	50.
12			20.
80			1000.
			12
	8|0)1200|0		
	4)150		
	£. 37-2 Months.		

If a Yard of broad Cloth coſt 18 Shillings, what coſt 5 Pieces, each Piece containing 20 Yards.

yd.	*s.*	*Yards.*	20 *Yards.*
If 1	18	100	5 *pieces.*
		18	
		100 third	
	2|0)180|0	Term.	
	£. 90-0 Anſ.		

If

If at any time Damage having happened to any Goods, ſo as to make a propoſed loſs by the whole, then the ſaid loſs muſt be ſubtracted from the coſt, and the Remainder made the ſecond Term, ſee the next Example.

I have by me 96*lb.* of Cloves, which coſt me 58*l.* but ſome damage having happened to them, I am willing to loſe 8*l.* in the whole, at what rate muſt I ſell them *per oz.*

	lb.	*l.*	*oz.*	*l.*	
If	96	—	50 — 1	58	Coſt.
	16		20	8	Loſs.
	1536		1000	50	2*d.* Term.
			12		

1536)12000(7*d.* $\frac{3}{4}$ Anſwer.
10752

1248
4

1536)4992($\frac{3}{4}$
4608

384 = $\frac{384}{1536}$

If

If 30s. and a Mark for 15 Weeks ſupply, For Meat and Drink, that is my Board, How much a Day pay I

15 *Weeks.*
7 *Days in a Week.*
105

days	*s.*	*d.*	*day.*	*s.*	*d.*
If 105	43	4	1	30	0
	12			13	4
	d.				
105)520(4			Anſ.	43	4
420					
100					
4					
105)400(3/4					
315					
85					

Suppoſe my Salary be 40 Pounds *per Annum*, what is that *per* Day.

days	*l.*	*day,*
If 365	40	1
	20	
	s.	*d.*
365)800(2		2 1/4 Anſwer
730		
70		
12		
365)840(2		
730		
110		
4		
365)448(1		
365		
83/365		

Bought

Bought a Box of ſuperfine Tea, which weighed 2*qr.* 7*lb.* and gave 73*l.* 12*s.* 7*d.* ½, for it, what is 5*lb.* of it worth.

qr.	*lb.*	*l.*	*s.*	*d.*	*lb.*
If 2	7	—73	12	7 ½	—5
28		20			
63		1472			
		12			
		17671			
		4			
		70686			
		5			
		4)			
63)353430(		5610			
315					
		12(1402-½			
384					
378		2|0)11|6-10			
63		£. 5-16-10 ½			
63		Anſwer.			
0					

See the reverſe of this Example. If 5*lb.* of Tea coſt 5*l.* 16*s.* 10*d.* ½, what coſt 2*qr.* 7*lb.* at the ſame rate.

lb.	*l.*	*s.*	*d.*	*lb.*
If 5	—5	16	10 ½	—63
	20			
	116			
	12			
	1402			
	4			
	5610			
	63			
	16830			
	33660			
5)353430				
4)70686				
12)17671-½				
2|0)147|2-7				
£. 73-12-7 ½ Anſ.				
Proof of the other Example.				

N. B. The Proof of each Example, is only varying the Operation as before taught.

Bought

Bought a Silver Cup and Tankard which weighed 3*lb.* 11*oz.* Troy, and coſt me 8*l.* 18*s.* 2*d.* ½, what did they lie me in *per* Ounce.

lb.	*oz.*	*l.*	*s.*	*d.*	*oz.*
If 3	11 ——	8	18	2 ½ ——	1

12
20
47
178
12
2138
2
2)
47)4277(91
423
12)45-½
47
47
3-9 ½ Anſ. *per* Ounce.
0

Note, This Example is brought into half-pence.

If 96 Ells, *Engliſh*, coſt 16*l.* 10*s.* what coſt 3 Yards.

Ells.	*l.*	*s.*	*Yds.*
If 96 ——	16	10 ——	3
5	20		4
480	330		12

12
3960
12
12)
480)47520(99
4320
8-3 Anſ.
4320
4320
0

Bought

Bought 4 Bags of Hops, which weighed as under.

No.	*C.*	*qr.*	*lb.*
1—	2	3	11
2—	1	2	27
3—	2	1	17
4—	1	3	15
	8	3	14

And gave after the rate of 5 Guineas *per C.* weight what do they come to.

If

lb.	*l.*	*s.*	*C.*	*qr.*	*lb.*
112—	5	5—	8	3	14

```
      20      888
     ---       98
     105      ---
              994
              105
             ----
             4970
            9940
           ------2|0)
     112)104370(93|1
         1008     ----
         ----     46-11-10½
          357     ---------
          336        Ans.
          ---
           210
           112
           ---
            98
            12
           ---  d.
     112)1176(10
         1120
         ----
           56
            4
         ----
     112)224(½
         224
         ---
           0
```

If

A

If the half of a Mark, buy the fourth of a Pound, How much Cochineal can I have for a Pound.

s.	*d.*	*oz.*	*s.*
If 6	8	4	5
6			6
—			—
40			30
			4
			—
			4|0)12|0
			—

Anſ. 3 Ounces.

Or Thus.

s.	*d.*	*oz.*	*s.*
If 6	8	4	5
3			3
—			—
20			15
			4
			—
			2|0)6|0
			—

Note, This is took for Groats, 3 being a Shilling, therefore you muſt reduce the firſt and laſt numbers into Groats, ſaying 3 times 6 is 18, and 8*d.* being two Groats makes 20.

Anſ. 3 Ounces.

Or Thus.

s.	*d.*	*oz.*	*s.*
If 6	8	4	5
12			12
—			—
80			60
			4
			—
			8|0)24|0
			—

Note, This is took for Pence, 12 Pence being a Shilling.

Anſ. 3 Ounces.

A

A Merchant at *London* bought 64 Tuns of *French* Wine, for 460*l*. the Freight thereof from *France* to *London* coſt 220*l*. for unloading and loading 10*l*. for Cuſtom 15*l*. the charge of the Cellar 8*s*. and would gain 250*l*. by the Bargain.

A Gentleman comes and demands the price of 24 Tuns of the ſaid Wine, the Queſtion is, what he muſt give.

Tuns.	*l.*	*s.*	*Tuns.*	*l.*	*s.*
If 64	955	8	24	460	0
	20			220	0
				10	0
	19108			15	0
	24 *Tuns.*			0	8
				250	0
	76432				
	38216		£.	955	8
	2|0				

Tuns. 64)458592(7 16\|5
448
£. 358-5-6 Anſ.
105
64
419
384
352
320
32
12
d.
64)384(6
384
0

In this Example, I add the prime coſt, what I would gain by it, and all other expences incident thereto, together, for the ſecond Term, and then work as before taught.

A Grocer bought 2 Chefts of Sugar, the one weighed neat 17*C*. 3*qr*. 14*lb*. at 2*l*. 6*s*. 8*d*. *per C*. the other weighed 18*C*. 1*qr*. 21*lb*. at 4*d*. ½ *per lb*. which he mixed together, now I defire to know how much an hundred weight of this mixture is worth.

lb.	*l.*	*s.*	*d.*	*C.*	*qr.*	*lb.*
If 112	2	6	8	17	3	14

20
17
17
46
1798
12
2002
560
560
120120
10010
12)
112)112120(10010
112
2|0)83|4-2
112
112 *£*. 41-14-2
0

lb.	*d.*	*C.*	*qr.*	*lb.*
If 1	4 ½	18	1	21

4
18
18
1849
2065
18
4)37170
22)9292-½
2|0)77|4-4
£. 38-14-4 ½

Here

Here having found the value of both the Chefts of Sugar, at the rate propoſed, to find what 1 *Cwt.* is worth, I add the given weights together, for the firſt Term, and alſo their value for the ſecond, and then work as before.

C.	*qr.*	*lb.*	*l.*	*s.*	*d.*	
17	3	14	41	14	2	
18	1	21	38	14	4 ½	
						lb.
If 36	1	7	80	8	6 ½	112

36
36
3635
4067

20
1608
12
19302
4
77210
112
154420
849310
4)
4067)8647520(2126
8134
12)531-½
5135
4067 2|0)4|4-3
10682 £. 2-4-3 ½ Anſr *per C.*
8134
25480
24402
1078
4067

What come 19*C*. 2*qr*. 12*lb*. of Sugar to at 5*d*. ½ *per lb*.

lb.	*d*.		*C*.	*qr*.	*lb*.
If 1	5 ½		19	2	12
	4		19		
			19		
	22		1968		
			2196		
			22		*Second Term.*
			4392		
			4392		
			4)48312		
			12)12078		
			2|0)100|6-6		
			£. 50-6-6		Anſ.

Queſtion by Mr. *T. Mayoh*, ſee his *Arithmetic*, Page 100.

If a Load of Malt be ſold for 1*l*. 4*s*. 6*d*, and out of it be brewed 45 Gallons of Ale, at 1*s*. 4*d*. *per* Gallon, and every Gallon pay 2*d*. for Exciſe, what is there remaining for Profit for the Brewer.

G.	*d*.	*G*.		*G*.	*d*.	*G*.	
If 1	16	45		If 1	2	45	
		16				2	
							s. *d*.
		12)720				90 =	7 6
		2|0)6|0					
Sold for £.		3- 0-0					
Exciſe		0- 7-6	Subtract.				
ſold for clear money		2-12-6					
the Malt coſt		1- 4-6					
Anſ.		1- 8-0	the *Brewer's* wages, beſides the ſmall Beer & Grains.				

If

If one Gallon of Beer be sold for 1*s*. 2*d*. what will 45 Gallons cost.

G.	d.	G.
If 1	14	45
		14
	12)630	
	2|0)5|2-6	

Anſ. 2-12-6 as before, clear Money.

A, owes *B*, 296*l*. 17*s*. but he compounds for 7*s*. 6*d*. in the Pound, what muſt *B*. receive for his Debt.

s.	*s*.	*d*.	*l*.	*s*.
If 20	— 7	6	— 296	17
	12		20	
	90		5937	
			90	2*d*. *number*.
	2|0)53433|0 - - - -			10
	12)26716			4
	2|0)222|6-4		2|0)4|0	
				2
£.	111-6-4 $\frac{1}{2}$ Anſ.			

If 1 *Cwt*. of Sugar coſt 78*s*. what's that *per* Pound.

lb.	*s*.	*lb*.
If 112	— 78	— 1
	12	
		d.
112)936(8 $\frac{1}{4}$ Anſ.		
896		
40		
4		
112)160($\frac{4}{7}$		
112		
48		
112		

The Sun is ſaid to perform one entire Revolution, or 360 Degrees in the ſpace of 365 Days, 5 Hours, 48 Minutes, and 57 Seconds of Time, called a *Tropical* or *Solar* Year; How much doth it move in one Day.

days. *h.* *M.* *Sec.*
365 5 48 57
24
1465
730
8765 *hours.*
60
525948 *Min.*
60
31556937 *Sec.*

360 *Deg*
Min. 60 1 *deg.*
21600
60 *Min.*
1296000 *Sec.*
Seconds.

1 *day* 24 *hours.*
60
1440 *Min.*
60
86400 *Sec.*
Seconds.

If 31556937—1296000—86400
86400
518400000
7776000
10368000
60
31556937)111974400000(3548
94670811
173035890
157784685
152512050
126227748
26284302
25245496
1038754
60
31556937)62325144(19
31556937
30768207
28401243
2366963 &c.

min. *sec.* *Th.*

Anſ. 59 8 19 $\frac{23669637}{31556937}$ in 1 Day.

59-8-19
Anſ.

To Prove the RULE of THRTE Direct.

Multiply the fourth number, or Anſwer to the Queſtion, by the firſt; then multiply the ſecond and third numbers together, and if the Products be alike, the work is right.

For trial of which, let us prove the third Queſtion in this RULE, which was, If 3 Ounces coſt 17*s.* what coſt 48 Ounces: and the Anſwer their found, or fourth number was 272 Shillings; which multiplied by the firſt number 3 produces 816, then multiply alſo the ſecond and third numbers together, *(viz.)* 17 and 48, and the Product is alſo 816, ſo the work is right.

But obſerve, when there is any remainder, after you have divided the Product of the ſecond and third numbers by the firſt, ſuch remainder muſt in the proof be added to the Product of the firſt and fourth numbers, which muſt be equal to the Product of the third number multiplied by the ſecond.

The Single *RULE* of *THREE*, INVERSE.

IN this RULE the fourth number ſought, bears the ſame proportion to the firſt, as the ſecond does to the third number.

The ſtating of the Queſtion in this RULE differs not from the method of ſtating in the *Direct* RULE; for the number that aſketh the Queſtion, muſt be the third number, here as well as there, *&c.* And to know when the Queſtion belongs to this RULE, and when to the *Direct*, obſerve this general RULE.

When the Queſtion is ſtated, conſider whether the fourth number, or Anſwer, ought to be more or leſs than the ſecond number, if more, the leaſt of the two extremes muſt be your Diviſor; but if it ought to be leſs, then the biggeſt of the two extremes muſt be your Diviſor, (here the firſt and third numbers are called extremes with reſpect to the ſecond.) If the firſt number is the Diviſor, then the Queſtion belongs to the *Direct* RULE; but if the third is the Diviſor, then the Queſtion is *Inverſe.*

In this RULE, multiply the firſt and ſecond numbers together, and divide that Product by the third, and the Quotient is the Anſwer, in the ſame name with the middle number.

In this RULE, when the third number is leſs than the firſt, then the Anſwer required will be greater than the ſecond, but when the third number is greater than the firſt, the Anſwer will be leſs than the ſecond.

If 48 Men can build a wall in 24 Days, how many Men can do the ſame in 192 Days.

days.	*Men.*	*days.*
If 24	48	192.

24

192
96

192)1152(6 Anſ. 6 Men.
1152

0

It is very evident that this Example is in *Reciprocal* or *Inverſe* proportion, for 192 Days will require a leſs number of Men to build it in than 24 Days, therefore 192 the greater extreme muſt be the Diviſor: ſee the directions given in Page 103.

If

If a Footman performs a journey in 3 Days, when the Day is 16 Hours long, how many Days will he require of 10 Hours long to perform the ſame journey in.

hours. days. hours.
If 16——3——10
16

10)48

4-8 Anſ. 4 Days 8 Hours.

If 12 Men can do a piece of work in 36 Days, in how many Days can 48 Men do the ſame, at the like rate of working.

Men. days. Men.
If 12——36——48
12

48)432(9 *days*, Anſ.
432

0

Here as 48 Men require a leſs time to perform it in than 12 Men, therefore 48 the greater extreme muſt be the Diviſor.

If 18 Men build a wall in 30 Days, in how many Days will 9 Men build it.

Men. days. Men.
If 18——30——9
18

9)540

60 Anſ. 60 Days.

Here, as 9 Men will require a greater time to build it in than 18, therefore 9, the leſſer extreme muſt be the Diviſor.

If 100*l.* Principal, in 12 Months gain 5*l.* Intereſt, I demand what Principal will gain the ſame Intereſt in 8 Months.

Mon. l. Mon.
If 12——100——8
12

8)1200

Anſ. 150 *l.*

If for the matting of a Room, there is required 100 Yards of a Yard broad, how many Yards will be required of 1 ½ Yard broad.

qr. *Yards.* *qr.*
If 4 —— 100 —— 6

4

6)400

66 4/6 Anſ.

1 ½ *Yard.*
4 *Qrs.* 1 *Yard.*
6 *third Term.*

A Regiment of Soldiers conſiſting of 1000, Men are to have new Coats, and each Coat to contain 2*yds.* 2*qr.* of Cloth that is 5 Quarters wide, and they are to be lined with Shalloon that is 3 Quarters wide, I demand how many Yards of Shalloon will line them.

Yds. *qr.*
2 2
4 *Qrs.* 1 *Yard.*

10
1000 *No.* of Men, or Coats.

qr. *qr.*
If 5 —— 10000 —— 3

5

4)50000

3)12500

4166-⅔ Anſ.

How much money muſt I lend for 12 Months, to requite my Friend, who lent me 730*l.* for 6 Months.

Mon. *l.* *Mon.*
If 6 —— 730 —— 12

6

12)4380

£. 365-0-0 Anſ.

Lent

Lent my Friend 479*l.* for 9 Months, he promiſing to do me the like kindneſs, but when I came to borrow of him, he could lend me but 239*l.* 10*s.* how long muſt I keep his money to make Plenary ſatisfaction for my kindneſs to him.

	l.	*Months.*	*l.*	*s.*
If	479	9	239	10
	20	9580	20	
	9580	86220	4790	

4790)86220(18 *Months* Anſ.
4790
38320
38320
0

Queſtion from Mr. SADLER, ſee his *Arithmetic*, Page 188.

A merry young Spark, one night in the dark.
Came to me to borrow a Crown,
Quoth he I will pay, in one Year I ſay,
The Caſh to you honeſtly down:
His words being true, I beg you will ſhew,
In figures as plain as you can,
How long he muſt lend me, 12 Shilling (his friend,)
To requite me, and you are the Man.

	s.	*days.*	*s.*
If	5	365	12
		5	

12)1825

152 $\frac{1}{12}$ So the Anſ. is 152 Days 2 Hours.

There was a certain building raiſed in 8 Months by 120 workmen, but the ſame being demoliſhed, it is required to be rebuilt in 2 Months, I demand how many Men muſt be employed about it.

Mon. *Men.* *Mon.*
If 8——120——2 Here as it will require a greater number of Men to rebuild it in 2 Months, than in 8, 2 your leſs extreme muſt be the Diviſor.
8
2)960
480 Anſwer, 480 Men.

If a board be 8 Inches in breadth, pray declare, What length of the board will juſt make a foot ſquare.

I. B. *I L.* *I. B.*
If 12——12——8
12
8)144
Anſ. 18 Inches long.

If 28 Shillings will pay for the carriage of 1 *Cwt.* 150 Miles, how far may 6*C.* be carried for the ſame money.

C. *Miles.* *C.*
If 1——150——6
1
6)150
Anſ. 25 Miles.

Admit

Admit 1600 Soldiers were beſieged in a Town, and their victuals were computed to ſerve them 4 Months; how many of thoſe Soldiers muſt depart the Garriſon, that the ſame victuals may ſerve the remaining Soldiers 16 Months.

	Men.	*Soldier.*	*Months.*
If	4	1600	16
		4	

16)6400(400 So many Soldiers muſt ſtay in the
64 Garriſon.

00

Conſequently 400 ſubtracted from 1600, leaves 1200 Soldiers that muſt go out of the Garriſon; which is the Anſwer required.

The following Queſtion by the celebrated Mr. JOHN TIPPER, firſt Author of the *Ladies Diary*.

Required the Time of counting a Million of money at the rate of 100*l.* a Minute.

	l.	*Minute.*	*l.*
If	100	1	1000000
			1

1|00)10000|00

6|0)1000|0

6)166-40

4)27-4

6-22-40

Anſwer, 6 Days, 22 Hours, 40 Minutes.

If

If 150 Pioneers cut a Trench in 24 Hours, how many muſt be ſet to perform it in 6 Hours.

Hours. Pioneers. Hours.
If 24——150——6
24
600
300
6)3600
600 Anſ.

If 10 Pounds worth of Wine at 18*d.* the Bottle, accomodate 30 Men, how many will the ſaid 10 Pounds entertain with wine at 3*s.* 6*d.* the Bottle.

d. Men. d.
If 18——30——42
18
42)540(12 $\frac{36}{42}$ Anſ. Perſons.
504
36

How much Shalloon at 3 Quarters wide, will ſerve to line 9 Yards of Cloth of 7 Quarters wide.

qrs yards. qrs.
If 7——9——3
7
3)63
Anſ. 21 *Yards.*

The

The Double *RULE* of *THREE*: DIRECT.

THIS RULE teacheth by 5 numbers known, how to find a ſixth unknown, in a direct proportion.

It is wrought by two Statings in the *Single* RULE of THREE *Direct*.

Note, The fourth Term in the firſt ſtating. makes the ſecond in the laſt.

If 100*l*. in 12 Months gain 5*l*. Intereſt, what will 25*l*. gain in 4 Months.

Here the ſuppoſition lies on the firſt numbers, *(viz.)* 100, 12, and 5, for it is ſaid, if (or ſuppoſe) 100*l*. in 12 Months gain 5*l*. Intereſt, and the demand lies on the two laſt numbers, *(viz.)* 25 and 4, for it is demanded, what will 25*l*. gain in 4 Months.

In your firſt ſtating, you muſt obſerve always to make that the ſecond number, which is of the ſame denomination with the number required; and one of the other numbers in the ſuppoſition (it matters not which) muſt be the firſt number; and that number in the demand of the ſame name with the firſt, muſt be the third number; and then your firſt ſtating will ſtand thus.

l. Prin. *l*. Int. *l*. Principal.

If 100—gain—5——what 25.

Here the ſecond number is of the ſame name with the number required; for the Intereſt of 25*l*. is required; and the ſecond number is Pounds Intereſt; and the firſt number is Pounds Principal; and ſo is the third number 25*l*. being one of the numbers in the demand. And being ſo ſtated, I work as in the *Single* RULE of THREE, thus.

If

	l.	*P.*	*l.*	*I.*	*l.*	*P.*
If	100	——	5	——	25	
					5	
					)1|25	
					20	
					5|00	Anf. 1*l.* 5*s.*

Here I cut off two figures towards the right hand, which is divided by 100, as has been before ſhewn in *Diviſion.*

And having now found the Intereſt of 25*l.* by the firſt Operation, I proceed to the ſecond: and note always, that the Anſwer to the firſt ſtating, is the middle number to the ſecond.

As thus.

	Mon.	*s.*	*Mon.*
If	12	—— 25 ——	4
		4	
	12)100		
	8*s.* 4*d.* Anf.		

Here in the ſecond ſtating, the remaining number in the ſuppoſition is the firſt; and the other of the ſame name in the demand, is the third number, and the middle number is of the ſame name we ſeek for *(viz.)* Intereſt; and is the Anſwer to the Queſtion, *(viz.)* 8*s.* 4*d.*

The

The ſame Anſwer will alſo be found, if you work after the following manner.

Mon.	*l.*	*Mon.*
If 12	5	4
	4	
	12)20	
Anſ.	1-13-4	

l.	*l.*	*s.*	*d.*	*l.*
If 100	1	13	4	25
	20			
	33			
	12			
	400			
	25			
	2000			
	300			
	12)			
1| 00)100| 00(100				
	1			
	8*s.* 4*d*: Anſ.			
	00 the ſame as before			

The laſt Queſtion, or any other in this Rule may alſo be anſwered by a RULE compoſed of the five given numbers, after this manner: ſtate the Queſtion ſo, that the numbers may ſtand in one continued rank, and in ſuch order, that the firſt and fourth numbers may be of one denomination, and the ſecond and fifth.

Then multiply the two firſt numbers together, for a Diviſor; and the three laſt together for a Dividend, and the Quotient will be the Anſwer, in the ſame name with the middle or third number, for a trial of which, let us take the laſt Example, *(viz.)*

☞ Work'd in the next Page.

If

l. *Mon.* *l.* *l.* *Mon.*
If 100 in 12 gain 5 what 25 in 4

12 20

1200 100

25 *4th. number.*

500
200

2500

4 *5th. number.*

Divisor 12|00)100|00

8*s.* 4*d.* Anf.

Here the Queſtion is ſtated and worked as before directed; and the Anſwer is 8*s.* 4*d.* as it was when wrought at two Operations.

If 100*l.* in 12 Months gain 5*l.* Intereſt, what Intereſt will 89*l.* gain in 8 Months at that rate.

Mon. *l.* *Mon.*
If 12 — 5 — 8

8

40

3-4

20

12)80

6-8

l. *l.* *s.* *d.* *l.*
If 100 — 3 6 8 — 89

20

66

12

800

89

7200

6400

1|00)7 12|00

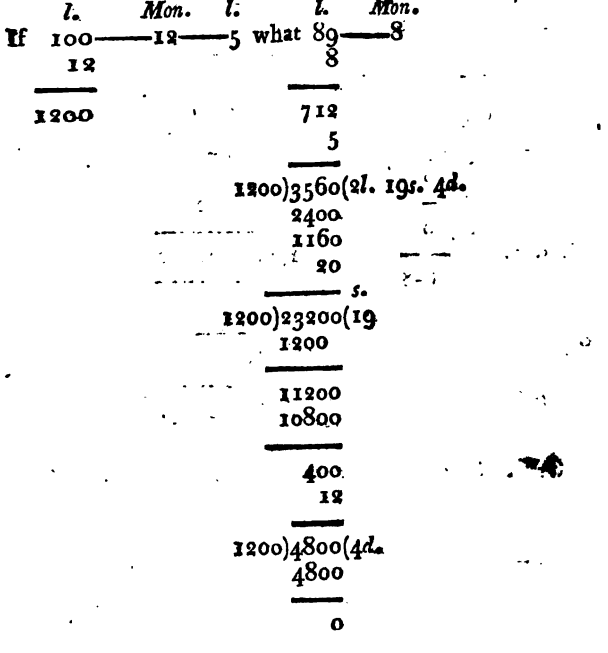
12)7 12

2|0)5|9-4

Anf. 2-19-4

The

The laſt Example may be worked thus, at one Operation, ſee the work.



Anſwer, 2*l.* 19*s.* 4*d.* the ſame as before.

If

If 100*l.* Principal in 12 Months gains 5*l.* Intereſt, what will 180*l.* gain in 8 Months.

Mon.	*l.*	*Mon.*
If 12	5	8
	8	
	12)40	
	3—4	
	20	
	12)80	
l. s. d.		6-8
3 6 8		

l.	*l. s. d.*	*l.*
If 100	3 6 8	180
	20	
	66	
	12	
	800	
	180	
	1|00)1440|00	
	12)1440	
	2|0)12|0	
	Anſ. 6 *£.*	

Or the ſame Example may be worked thus, at one Operation.

l.	*Mon.*	*l.*	*l.*	*Mon.*
If 100	12	5	180	8
12			8	5*th. number.*
1200			1440	
			5	3*d. number.*
Diviſor. 12|00)72|00				

Anſ. 6 The ſame as when wrought at two Operations.

What

What comes the Intereſt of 179*l.* 17*s.* 6*d.* to, for 9 Months, at 5*l. per Cent, per Annum.*

Mon.	*l.*	*Mon.*
If 12	5	9
	5	
12)	45	
	3	9
	20	
12)	180	
		15

Anſ. 3*l.* 15*s.*

	l.	*s.*	*d.*
If 100	3	15	0
	20	20	
	2000	75	
		12	
	24000	900	

l.	*s.*	*d.*
179	17	6
	20	
	3597	
	12	
	43170	

900 2*d. No.*

12)

24|000)38853|000(1618

24

148

144

45

24

213

192

21

4

24)84($\frac{3}{4}$

72

12

Anſwer 6*l.* 14*s.* 10*d.* $\frac{3}{4}$

2|0)13|4-10

6-14.10

See

See the laſt Queſtion perform'd by *Simple Intereſt.*

	l.	*l.*	*l.*	*s.*	*d.*
If	100	5	179	17	6
					5
			8	99	7 6

Months.	*l.*	*s.*	*d.*	
6 is ½	8	19	10	½
3 is ½	4	9	11	¼
	2	4	11	½
l.	6	14	10	¾

19|87
12
10|50
4
½|00

Anſwer, 6*l.* 14*s.* 10*d.* ¾, the ſame as before.

If 40 Acres of Graſs be mowed by 8 Men in 7 Days, how many Acres ſhall be mowed by 24 Men in 28 Days.

Men.	*Acres.*	*Men.*
If 8	40	24
	24	
	160	
	80	
	8)960	
	120 Acres.	

days.	*Acres.*	*days.*
If 7	120	28
	28	
	960	
	240	
	7)3360	
Anſ.	480 Acres.	

Or

Or ſee the laſt *EXAMPLE*, at one Operation.

day..	*Men*.	*Acres*.	*days*.	*Men*.
If 7	8	40	28	24

8 28

56 320
80

1120
24

4480
2240

56)26880(480 Anſ.
224

448
448

00

So the Anſwer is the ſame as when perform'd at two Operations.

If the

If the Carriage of 7*C.* weight 128 Miles coſt 4*l.* 8*s.* how much muſt I pay for 3*C.* weight, carried 32 Miles, after the ſame Rate.

C. s. C.
If 7—48—3
3
7)144
20—4
12
7)48
6—6
4
7)24
3 $\frac{3}{4}$
1*l.* 0*s.* 6*d.* $\frac{3}{4}$

Miles. l. s. d. Miles.
If 128—1 0 6 $\frac{3}{4}$——32
20
20
12
246
4
987
32 3*d. number.*
1974
2961
4)
128)31584(246
256
598
512
864
768
96

Anſ. 5*s.* 1*d.* $\frac{1}{2}$.

See the laſt *EXAMPLE*, wrought at one ſtating.

C.	*Miles.*	*s.*	*C.*	*Miles.*	
If 7	128	48	3	32	
	7			3	4*th number.*
Diviſor.	896			96	
				48	3*d. number.*
				768	
				384	
					s.
				896(4608(5	
				4480	
				128	
				12	
					d.
				896(1536(1	
				896	
				640	
				4	
				896(2560($\frac{1}{2}$	
				1792	
				$\frac{768}{896}$	Anſ. 5*s.* 1*d.* $\frac{1}{2}$, as before.

An Usurer put out 75*l.* to receive Intereſt for theſame, and when it had continued 9 Months, he received for Principal and Intereſt, 78*l.* 7*s.* 6*d.* I demand at what rate *per Cent, per Annum*, he received intereſt.

l.	*s.*	*d.*	
78	7	6	*Prin.* & *Int.*
75	0	0	Put out.
l.			*l.*
If 75	3	7	6—100

20
67
12
810
100 12)
75)81000(1080
75
2|0(9|0
600
600 *£.* 4-10 Anſ.
0

Mon.	*l.*	*s.*	*Mon.*
If 9	4	10	12

20
90
12
9)1080
2|0)12|0
6-0 Anſ.

See the ſame EXAMPLE, wrought at one Operation,

	l.	*Mon.*	*l.*	*s.*	*d.*	*l.*	*Mon.*
If	75	9	3	7	6	100	12

9
Diviſor 685

20
67
12
810 100 *4th number.*
81000 12 *5th number.*
12)
675)9720000(1440
675
2970 2|0)12|0
2700
2700 *£.* 6 Anſ. as before.
2700
00

If

If 40 Buſhels of Oates be enough for 8 Horſes 20 Days, how many Buſhels will ſerve 48 Horſes 12 Days.

Hor.	*Buſh.*	*Hor.*
If 8	40	48
		40
		8)1920
		240

Day.	*Buſh.*	*Days.*
If 20	240	12
		12
		2|0)288|0
	Buſhels.	144 Anſ.

If 40s. is the wages of 8 Men 5 Days, what ſhall be the wages of 32 Men, 24 Days.

Men.	*s.*	*Men.*
If 8	40	32
		32
		80
		120
		8)1280
		2|0)16|0
		£. 8

days.	*l.*	*days.*
If 5	8	24
		8
		5)192
		£. 38-8 Anſ

If the Carriage of a Ton weight, or 2240*lb.* from *Chester* to *London* which is 182 Miles, at 1*d. per* Pound, 9*l.* 6*s.* 8*d.* what will the Carriage of 3 Ton weight, or 6720*lb.* cost 240 Miles.

```
      lb.  Miles.   l. s. d.      lb.   Miles.
If 2240—182——9 6 8——6720—240
    182        20          240  5th number.
   ----       ----       ------
   4480       180       268800
  17920        12       13440
  2240       ----      -------
  ------     2240      1612800
  407680     ----         2240  3d. number.
                       -------
                       64512000
                       3225600
                       3225600
                       ---------- 12)
1st. No. & Divisor. 40768|0)3612672000(8861
                       326144
                       ------   2|0)73|8-5
                       351232
                       326144  £. 36-18-5 ½
                       ------
                        250880
                        244608
                        ------
                         62720
                         46768
                         ------
                         219520
                              4
                         ------
                  40768|0)87808|0(½
                         81536
                         ------
                         62512
                         ------
                         407680
```

Answer, 36*l.* 18*s.* 5*d.* ½.

See the

See the ſame Example work'd at two ſtatings.

Ton. l. s. d. Tons
If 1—9 6 6—4
20
186
12
2240
3
12)6720
2|0)56|0
£. 28-0

Miles. l. Miles.
If 182—28—240
28
1920
480
l. s. d.
182)6720(36 18 5 $\frac{5}{2}$
546
1260
1092
158
20
s.
182)3360(18
182
1540
1456
84
12
d.
182)1008(5
910
98
4
182)392($\frac{2}{2}$
364
28

Admit the Garrison of *Gibraltar* consists of 11232 Soldiers, and they drink out 1404 Gallons of Wine in 56 Days; how many Gallons will a Regiment of Soldiers, which consists of 936 Men, drink in 168 Days.

Soldiers.	*days.*	*Gallons.*	*Soldiers.*	*days.*	
If 11232	56	1404	936	168	
56				936	*4th number.*
67392				1008	
56160				504	
628992				1512	
				157248	
				1404	*3d. number.*
				628992	
				220147 20	

Divisor, 628992)220776192(351

1886976

3207859
3144960

628992
628992

0

Answer, 351 Gallons.

The

The Double *RULE* of *THREE.*

INVERSE.

HAVING ſtated your Queſtion, according to the *Double* RULE aforegoing, you muſt *note*, That in this RULE, the one proportion is *Direct* and the other *Inverſe*, and muſt be worked accordingly.

N. B. the fourth Term in the firſt ſtating is the ſecond in the laſt.

If 12 Students in 8 weeks ſpend 48*l.* I demand how many Students will ſpend 288*l.* in 18 weeks.

l.	*Students.*	*l.*		*Weeks.*	*s.*	*Weeks.*
If 48	12	288		If 8	72	18
		12			8	
		48)3456(72			18)576(32 Anſ.	
		336			36	
		96			0	
		96				
		0				

Anſwer, 32 Students.

Any

Any Queſtion in this RULE may alſo be anſwered by the Compound RULE of five numbers; obſerving to make the ſecond and fourth numbers of the like name, and the third and fifth; then multiply the third and fourth numbers together for a Diviſor, and the other three remaining numbers together for a Dividend, and the Quotient will be the Anſwer, in the ſame name with the firſt number.

See the firſt Example wrought by the Compound RULE of five Numbers, thus.

Studens.	*Weeks.*	*l.*	*Weeks.*	*l.*	
If 12	8	48	18	288	
		18		8	*2d. number.*
Diviſor,	864			2304	
				12	*1ſt. number.*

Diviſor 864)27648(32 Anſwer.
2592

1728
1728

0

So the Anſwer is 32 Students, the ſame as when wrought at two Operations.

If

If 100*l.* in 12 Months require 5*l.* Intereſt, what Principal will 9*l.* 7*s.* 6*d.* require in 9 Months at that Rate.

Mon	*l.*	*Mon.*		*l.*		*l.*	*s.*	*d.*		*l.*	*s.*	*d.*
If 12	—100—	9	If 5	——	133	6	8	——	9	7	6	
12			20		20				20			
9)1200			100		2666				187			
			12		12				12			
133—3			1200		32000				2250			
20					2250							
9)60					1600000							
6—6					64000							
12			12|00)7		20000|00							
9)72			12)60000									
8			2|0)500|0									
			£.		250-0-0 Anſwer.							

See the ſame Example wrought at one Operation.

l.	*Mon.*	*l.*	*Mon.*	*l.*	*s.*	*d.*
If 100	—12—	5	—9—	9	7	6
		20		20		
		100		187		
		12		12		
		1200		2250		
		94*th No*		12 *2d. number.*		
Diviſor,		10800		27000		
				100 *1ſt. number.*		
		108|00)27000|00(250 £.				
		216				
Anſwer, 250*l.* the ſame as when done at 2 Operations.		540				
		540				
		00				

If 48*l.* ſerve 12 Students 8 Weeks, how many Weeks will 288*l.* ſerve 4 Students.

l.	*Weeks.*	*l.*
If 48	8	288
		8
		8)2304
		6)288
		48

Stud.	*Weeks.*	*Stud.*
If 12	48	4
		12
		4)576
		144

Anſ. 144 *Weeks.*

See the ſame Example, by one Operation.

Week.	*St.*	*l.*	*St.*	*l.*	
If 8	12	48	4	288	
		4		12	2*d. No.*
Diviſor,		192		3456	
				8	1*ſt. No.*
				192)27648(144 Anſ.	
				192	
				844	
				768	
				768	
				768	
				0	

So the Anſwer is the ſame as when performed by two ſtatings.

Put

Put out for 7 Months a Sum of Money at 5*l.* *per Cent*, *per Annum*, and received for Interest 2*l.* 17*s.* 4*d.* $\frac{1}{4}$, I demand what was the Sum put out.

```
Mon.  l.  Mon.      l.        l.  s. d.    l.  s. d.
If 12—100—7       If 5———171  8  6 ¾—2  17  4 ¼
       12            20        20          20
     ———           ———       ———         ——
  7)1200           100      3428          57
     ———————         12        12          12
£.  171-8-6¾      ———      ———         ———
                  1200     41142         688
                     4         4           4
                  ———      ———         ———
                  4800    164571        2753
                  ———       2753        ———
                          ———
                          493713
                         822855
                        1151997
                        329142
                        ———————— 4)
1st. number 48|00)4530639|63(94388
                  432          ———
                  ———        12)23597
                   210         ———
                   192       2|0)196|6-5
                   ———        ———————
                    186      £. 98-6-5 Ans.
                    144
                    ———
                     423
                     384
                     ———
                      399
                      384
                      ———
                       1563 Remainder.
```

If when the Tun of Wine is worth 30*l.* a Hundred Men will be ſatisfied with 20*l.* worth, I deſire to know what the Tun is worth, when 4*l.* worth, will ſatisfy 25 Men at the ſame Rate.

Men. *l.* *Men.* *l.* *l.* *l.*

If 100——30——25 If 20——120——4

30 4

25)3000(120*l.* 8|0)48|0

25 *£.* 24 Anſ.

50

50

00

If 50 Pioneers in 6 Days caſt a Trench 30 Yards long, how many Pioneers will caſt a Trench 200 Yards long in 3 days.

days. *Pioneers.* *days.* *yards.* *Pioneers.* *yards.*

If 6——50——3 If 30——100——200

6 100

3)300 3|0)2000|0

100 666-$\frac{2}{3}$ Anſ.

See this Example wrought by the *Compound* Rule of five numbers. *Pion.* *days.* *yard.* *days* *yards.*

If 50——6——30——3——200

3 6 2*d. number.*

Diviſor, 90 1200

50 1*ſt number.*

90)60000(666 $\frac{2}{3}$

540

600

540

600

So the Anſwer is 666 $\frac{60}{90}$ or $\frac{2}{3}$, the ſame as when perform'd at 2 operations. 540

60

If

If 36*l.* ſerve for the board of 12 Perſons 6 Weeks, how many Weeks will 260*l.* ſerve for the Board of 36 Perſons.

Perſ. Weeks. Perſ.
If 12——6——36
12
36)72(2
72
0

l. Weeks. l.
If 36——2——260
2 *2d. No.*
36)520(14 *Weeks*
36
100
144
16
7
36)112(3 *Days*
108
4

Anſwer 14 Weeks, 3 Days.

See the ſame Example, at one Operation.

Weeks. Perſ. l. Perſ. l.
If 6——12——36——36——260
36 *4th No.* 12 *2d. No.*
216 3120
108 6 *1ſt. No.*
1296 1296)18720(14 *Weeks.*
1296
5760
5184
576
7 *days* 1 *W.*
1296)4032(3 *Days.*
3888
144

Anſwer, 14 Weeks 3 Days.

Single

Single *FELLOWSHIP.*

or, *Fellowſhip* without *Time.*

THIS RULE teacheth when Merchants or Tradeſmen enter Partners, how to ſhare or Divide their gain or loſs, proportionably to their Stocks put in, without any reſpect to the time their money continued in Stock.

Alſo by this RULE the Eſtate of a Bankrupt may be divided amongſt his Creditors.

Likewiſe Legacies may be adjuſted when there is a deficiency of Effects.

RULE.

Add the ſeveral ſums that the ſeveral Perſons adventuring put into Stock altogether, which ſum ſhall be the firſt number in the RULE of THREE *Direct*, then the ſum that is either gained or loſt, in the adventuring, the ſecond, and every Man's Particular Stock the third number.

N. B. That the RULE of THREE is to be performed ſo often as there are Perſons adventuring.

A, B,

A, *B*, and *C*. enter Partners, *A*, put into Stock 173*l*. *B*, puts in 239*l*. and *C*, puts in 297*l*. and they gained 193*l*. how much is each Man's share in the gain.

l. *l*. *l*.

If 709 gain 193 what will 173 *A's* stock gain.

	l.
A's	173
B's	239
C's	297
	709

```
                    193
                    ---
                    519
                   1557
                   173
                   -----
1st. number  709)33389(47l.
                 2836
                 ----
                  5029
                  4963
                  ----
                    66
                    20
                  ----
             709)1320(1s.
                  709
                  ---
                  611
                   12
                  ---
             709)7332(10d.
                 7090
                 ----
                  242
                    4
                 ----
             709)968(¼
                  709
                  ---
                  259
```

A's 47*l*. 1*s*. 10*d*. $\frac{1}{4}$, $\frac{259}{709}$

If 709

l. *l.* *l.*
If 709—193—239 *B's* stock.
239

1737
579
386

709)46127(65*l.*
4254

3587
3545

42
20

709)840(1*s.*
709

131
12

709)1572(2*d.*
1418

154
4

616 616/709

B's, 65*l.* 1*s.* 2*d.* 616/709

	l.	*s.*	*d.*
Anf. *A's*	47	1	10 ¼
B's	65	1	2
C's	80	16	11 ¼
Remains			½
Proof,	193	0	0

l. *l.* *l.*
If 709—193—297 *C's* stock.
193

891
2673
297

709)57321(80*l.*
5672
601
20

709)12020(16*s.*
709

4930
4254

676
12

d.
709)8112(11
7799

313
4

709)1252(¼
709

543 543/709

Remainders, 259, 616, 543

709)1418(½
1418

0

C's 80*l.* 16*s.* 11*d.* ¼,

A Merchant

A Merchant is Indebted to *A*, 70*l*. to *B*, 400*l*. to *C*. 140*l*. 12*s*. 6*d*. but upon his deceafe, his Eſtate is found to be worth no more than 409*l*. 14*s*. how muſt it be divided among his Creditors.

	l.	*s.*	*d.*
Due to *A*,	70	0	0
— to *B*,	400	0	0
— to *C*,	140	12	6
1ſt Term,	610	12	6

l. *s.* *d.* | *l.* *s.* | *l.* | *l.*

If 610 12 6 — 409 14 —— 70

20 20 20

12212 8194 1400

18 16800 12

146550 6555200 16800

49164

8194

2|0)

146550)137659200(93|9

1318950

46-19

576420

439650

1367700

1318950

48750

12

d.

146550)585000(3

439650

145350

4

146550)581400($\frac{3}{4}$

439650

141750

If 6

A's, 46*l*. 19*s*. 3*d*. $\frac{141750}{146550}$

	l.	s.	d.		l.	s.		l.
If	160	12	6	——	409	14	——	400
	20				20			20
	12212				8194			8000
	12				96000			12
	146550				49164000			96000
					73746			

2|0)

146550)78662400(536|7

732750

£. 268-7-7 ¼

598740

439650

990900

879300

1116000

1025850

90150

12

d.

146550)1081800(7

1025850

55950

4

146550)223800(¼

146550

77250

B's 268l. 7s. 7d. ¼, 77250/146550

If 610

	l.	*s.*	*d.*		*l.*	*s.*		*l.*	*s.*	*d.*
If	610	12	6	——	409	14	——	140	12	6
	20				20			20		
	12212				8194			2812		
	12				33750			12		
	146550				409700			33750		

57358
24582
24582 2|0)

146550)27654750 0(188|7
146550
1299975
1172400
1275750
1172400
1033500
1025850
7650
12
91800
4
146550)367200(½
293100
74100

£. 94-7-0½

Cs 94*l.* 7*s.* 0*d.* ½,

74100/146550

		l.	*s.*	*d.*
Anſ.	*A's*	46	19	3 ¾
	B's	268	7	7 ¼
	C's	94	7	0 ½
	Remains			½
Proof.		409	14	0

Remainders { 141750, 77250, 74100 }

146550)293100(½
293100
0

A, B,

A, *B*, and *C*, found a Purſe, in which was 20 Shillings, of which *A*, had $\frac{1}{2}$, *B*, $\frac{1}{3}$, and *C*, $\frac{1}{4}$, how much was each Man's Exact ſhare of the 20 Shillings.

	s.	d.
$\frac{1}{2}$	10	0
$\frac{1}{3}$	6	8
$\frac{1}{4}$	5	0
	20	

If 21.8—20—10

s.	d.	s.	s.
12		12	12
260		240	120
		120	

12) 26|0)2880|0(110

26

28

26

20

4

26|0)80($\frac{3}{4}$

78

2

s. 9-2 $\frac{3}{4}$

If 21 8—20—6 8

s.	d.	s.	s.	d.
12		12	12	
260		240	80	
		80		

12) 26|0)1920|0(73

182

100

78

22

4

26|0)88($\frac{3}{4}$

78

10

s. 6-1$\frac{3}{4}$

If 21 8—20—5

s.	d.	s.	s.
12		12	12
260		240	60
		60	

12) 26|0)1440|0(55

130

140

130

10

4

26|0)40($\frac{1}{4}$

26

14

4-7 $\frac{1}{4}$

Anſwer.

	s.	d.	
A's	9	2	$\frac{2}{4}$
B's	6	1	$\frac{1}{4}$
C's	4	7	$\frac{1}{4}$
remains			$\frac{1}{4}$
	20	0	Proof.

Remainders.

14

10

2

26|0)26($\frac{1}{4}$

26

0

Four

Four Partners *A*, *B*, *C*, and *D*, amongst them built a Ship, which cost 1730*l.* of which *A*, paid 346*l*, *B*, 519*l.* *C*, 692*l.* and *D*, 173*l.* and her Freight for a certain Voyage is 370*l.* I demand each Man's share therein, according to his charge in building her.

A's 346
B's 519
C's 692
D's 173

1730

1st. No

l. *l.* *l.*
If 1730—370—346
346
2220
1480
1110
1730)128020(74*l.*
12110
6920
6920
0

l. *l.* *l.*
If 1730—370—519
519
3330
370
1850
1730)192030(111*l.*
1730
1903
1730
1730
1730
0

l. *l.* *l.*
If 1730—370—692
692
740
3330
2220
1730)256040(148*l.*
1730
8304
6920
13840
13840
0

l. *l.* *l.*
If 1730—370—173
173
1110
2590
370
1730)64010(37*l.*
5190
12110
12110
0

l.
A's 74
B's 111
C's 148
D's 37
£. 370 *Proof*

A

A Grandfather, Father, and Son, going to a Fair found 40 Shillings, the Grandfather would have $\frac{1}{2}$, the Father $\frac{1}{3}$, and the Son $\frac{1}{4}$, how much of the 40 Shillings muſt each have,

s.	d.
20	0
13	4
10	0
43	4

If 43 s. 4 d. — 40 s. — 20 s.

12

520

240

40

52 | 0) 960 | 0) 18 - 5 $\frac{1}{2}$

52

440

416

240

12

520) 2880 (5 d.

2600

280

4

520) 1120 ($\frac{2}{2}$

1040

80

Grandfather's 18 s. 5 d. $\frac{1}{2}$.

If 43 s. 4 d. — 40 s. — 13 s. 4 d.

12

520

160

40

52 | 0) 640 | 0 (12 s.

624

160

12

52 | 0) 192 | 0 (3 d.

156

360

4

52 | 0) 144 | 0 ($\frac{2}{2}$

104

400

Father's 12 s. 3 d. $\frac{1}{2}$.

If

	s.	d.		s.	s.
If	43	4	——	40	—— 10
	12				12
	520				120
					40

s. d.

52|0)480|0(9-2 ¾ Sons.
468

120
12

52|0)144|0(2d.
104

400
4

52|0)160|0(¾
156

40

Anſ

	s.	d.	
Grandfather's	18	5	½
Father's	12	3	½
Son's	9	2	¾
Remains			¼
£.	40	0	Proof.

Remainders { 80 / 400 / 40

52|0)52|0(¼
52
—
0

If

If the Money and Effects of a Bankrupt amount to 1400*l.* 14*s.* 6*d.* and he is indebted to *A*, 742*l.* 12*s.* to *B*, 641*l.* 19*s*, 8*d.* to *C*, 987*l.* 19*s.* 9*d.* how must it be divided amongst them.

	l.	*s.*	*d*
A's	742	12	0
B's	641	19	8
C's	987	19	9
	2372	11	5
	20		
	47451		
	12		
	569417		

	l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*
If	2372	11	5—	1400	14	6—	742	12
				20			20	
				28014			14852	
				12			12	
				336174			178224	
				178224			3*d.* *number.*	
				1344696				
				672348				
				672348				
				2689392				
				2353218				
				336174				

12)
569417)59914 74976(105220
569417
2|0)876|8-4
2972574
2847085 £. 438-8-4 ¼
1254299
1138834
1160657
1138834
218236
4
569417(872944(¼
569417
303527

A's 438*l.* 8*s.* 4 ¼.

If 2372

	l.	s.	d.		l.	s.	d.		l.	s.	d.
If	2372	11	5	—	1400	14	6	—	641	19	8
	20				20				20		
	47451				28014				12839		
	12				12				12		
	569417				336174				154076		
					154076						
					2017044						
					2353218						
					13446960						
					1680870						
					336174						
					12)						
					569417)51796345224(90963						
					5124753						
					2|0)758|0-3						
					5488152						
					5124753 £. 379-0-3 ¼						
					3633992						
					3416502						
					2174904						
					1708251						
					466653						
					4						
					569417)1866612(¾						
					1708251						
					158361						

Bs 379*l*, os. 3*d*. ¾.

I

If 2372

	l.	s.	d.		l.	s.	d.		l.	s.	d.
H	2372	11	5	—	1400	14	6	—	987	19	9
	20				20				20		
	47451				28014				19759		
	12				12				12		
	569417				336174				237117		

237117
2353218
336174
336174
2353218
1008522
672348

569417)797125703 58(1399 89
569417

2277087
1708251
5688360
5124753
5636073
5124753
5113205
4555336
5578698
5124753
453945
4
569417)18157 80($\frac{3}{4}$
1708251
107529

12)
2|0)1166|5-9

£. 583-5-9 $\frac{3}{4}$

Remainders { 303527, 158361, 107529

569417)569417($\frac{1}{4}$
569417
0

	l.	s.	d.	
A's	438	8	4	$\frac{1}{4}$
B's	379	0	3	$\frac{3}{4}$
C's	583	5	9	$\frac{3}{4}$
Remains,				$\frac{1}{4}$
£.	1400	14	6	Proof.

C's, 583l. 5s. 9d. $\frac{3}{4}$.

Double

Double *FELLOWSHIP*,

Or; *Fellowſhip* with *Time*.

IN this RULE of *Fellowſhip* with *Time*, there are two things chiefly to be conſidered, *(viz.)* The difference of Stock and the difference of Time, the beſt way to perform it, is by multiplying the Money and the Time of each Adventure together, and all the Products added together to be the whole Stock, Then as the Sum of their Product is to the whole gain or loſs, ſo is each particular Product to the particular Man's gain or loſs, ſo then the RULE is wrought as that without *Time*.

Two Merchants *A*, and *B*, enter Partners, *A*, puts into Stock 196*l*. for 6 Months, and *B*, puts in 369*l*. for 9 Months, and they gained 98*l*. I demand each Man's ſhare of the gain.

l.	*l.*	*l.*	*l.*	*l.*	
196	369	If 4497	gain 98	what 1176	*A's ſtock & time.*
6	9			98	
1176	3321			9408	
	1176			10584	
	4497			4497)115248(25*l.* 12*s* 6*d.* ½	
				8994	
				25308	
				22485	
				2823	
				20	
				4497)56460(12*s.*	
				53964	
				2496	
				12	
				4497)29952(6*d.*	
				26982	
				2970	
				4	
				4497)11880(½	
				8994	
				2886	

A's 25*l.* 12*s.* 6*d.* ½.

If 4497

If *l.* 4497 gain *l.* 98 what *l.* 3321 *B's* Stock and Time.

98

26568
29889

4497)325458(72*l.* 7*s.* 5*d.* ¼
31479

10668
8994

1674
20

4497)33480(7*s.*
31479

2001
12

4497)24012(5*d.*
22485

1527
4

4497(6108(¼
4497

1611

B's 72*l.* 7*s.* 5*d.* ¼.

Anf. { *A's* 25 12 6 ½ / *B's* 72 7 5 ¼ / Remains, ¼ } 98 0 0 Proof.

Remainders { 2886 / 1611 }

4497)4497(¼
4497

0

Three Graziers *A*, *B*, and *C*, take a piece of Land for the Rent of 55*l*. 10*s*. into which *A*, puts 12 Cows for 3 Months, *B*, put in 18 Cows for 4 Months, and *C*, put in 26 Oxen for 5 Months, how much muſt each Man pay of the Rent, proportionably to his Cows put in, and Time they continued in.

	l.	*s.*	*d.*	
Anſ. *A's*	8	7	10 ¼	
B's	16	15	9 ½	
C's	30	6	3 ½	
Remains			¼	
Proof,	55	10	0	

Remainders. 38, 76, 124

238)238(¼
238
0

Three Merchants join in Trade, *A*, put in 400*l*. for 9 Months, *B*, 680*l*. for 5 Months, *C*, 120*l*. for 12 Months, but by misfortune, they loſt Goods to the value of 500*l*. what muſt each Man ſuſtain of the loſt.

	l.	*s.*	*d.*	
Anſ. *A's*	213	5	4 ¼	
B's	201	8	5	
C's	85	6	1 ¼	
Remains			½	
Proof,	500	0	0	

Remainders, 2840, 7840, 6200

A, *B*,

A, *B*, and *C*, hold a paſture in common, for which they pay 20*l*. *per Annum*, in this paſture, *A*, had 40 Oxen for 76 Days, *B*, had 36 Oxen for 50 Days, and *C*, had 50 Oxen for 90 Days, I demand what part every of theſe Tenants ought to pay of the 20*l*,

	l.	*s.*	*d.*
Anſ. *A's*	6	10	2 ¼
B's	3	17	1
C's	9	12	8 ½
Remains			¼
Proof,	20	0	0

Remainders	
	2340
	2000
	5000
	9340

A, *B*, and *C*, make a ſtock for 12 Months, *A*, put in at firſt 36*l*. and 4 Months after that, he put in 40*l*. *B*, put in at firſt 40*l*. and at the end of 7 Months he took out 8*l*. *C*, put in at firſt 14*l*. and 3 Months after, he put in 8*l*. more, and 5 Months after that, he put in 100*l*. more, and at the end of 12 Months their gain is found to be 143*l*. I deſire to know each Man's ſhare in the Gains, according to his Stock and Time.

	l.	*s.*	*d.*
Anſ. *A's*	55	3	6 ½
B's	52	16	9 ¼
C's	34	19	8
Remains			¼
Proof,	143	6	0

Remainders	
	560
	880
	664

Practice

PRACTICE.

PRACTICE is the abreviation or contraction of the RULE of THREE *Direct*, and is always known by having 1 or an Integer for the firſt Term in the RULE of THREE, and it is called the RULE of PRACTICE, becauſe Queſtions of this nature, are reſolved ſooner than by the RULE of THREE.

	d.	*Pts.*
The even Parts of a Shilling.	6	$\frac{1}{2}$
	4	$\frac{1}{3}$
	3	$\frac{1}{4}$
	2	$\frac{1}{6}$
	$1\frac{1}{2}$	$\frac{1}{8}$
	1	$\frac{1}{12}$

	s.	*Parts.*
The even Parts of a Pound.	10 0	$\frac{1}{2}$
	6 8	$\frac{1}{3}$
	5 0	$\frac{1}{4}$
	4 0	$\frac{1}{5}$
	3 4	$\frac{1}{6}$
	2 6	$\frac{1}{8}$
	2 0	$\frac{1}{10}$
	1 8	$\frac{1}{12}$
	1 0	$\frac{1}{20}$

	lb.	*Pts.*
The even Parts of a Quarter of a Hundred.	14	$\frac{1}{2}$
	7	$\frac{1}{4}$
	4	$\frac{1}{7}$
	$3\frac{1}{2}$	$\frac{1}{8}$
	2	$\frac{1}{14}$
	1	$\frac{1}{28}$

	lb.	*Parts.*
The even Parts of a Hundred.	56	$\frac{1}{2}$
	28	$\frac{1}{4}$
	16	$\frac{1}{7}$
	14	$\frac{1}{8}$
	8	$\frac{1}{14}$
	7	$\frac{1}{16}$

	C.	*Parts.*
The even Parts of a Ton.	10	$\frac{1}{2}$
	5	$\frac{1}{4}$
	4	$\frac{1}{5}$
	$2\frac{1}{2}$	$\frac{1}{8}$
	2	$\frac{1}{10}$
	1	$\frac{1}{20}$

In

In the *Rule* of *Practice* are 7 *Cases*.

CASE I. RULE I.

When the Price of an Integer is a Farthing, then take the $\frac{1}{6}$ part of the given number which will be so many three-halfpences, and if any thing remain it is Farthings, then consider that three-halfpence is $\frac{1}{8}$ part of a Shilling, wherefore take the $\frac{1}{8}$ part of them for Shillings, and if any thing remain, is so many three-halfpences, which Shillings reduce into Pounds, as in the following Examples.

$\frac{1}{6}$	7648 Ounces at $\frac{1}{4}$ *	$\frac{1}{4}$	$\frac{1}{6}$	6457 *lb.* at $\frac{1}{4}$ *per lb.*	
$\frac{1}{8}$	1274-1		$\frac{1}{8}$	1076-$\frac{1}{4}$	
2|0	15|9-4		2|0	13|4-6	
£.	7-19-4		£.	6-14-6 $\frac{1}{2}$	

Or thus, *per* Rule *of* Three.

	4)7648	$\frac{1}{6}$	3467 *yds.* at $\frac{1}{4}$ *per yd.*
	12)1912	$\frac{1}{8}$	577-1 $\frac{1}{4}$
2|0	)15|9-4	2|0	7|2-1 $\frac{1}{2}$
£.	7-19-4	£.	3-12-2 $\frac{1}{2}$

* In this Example the Price is $\frac{1}{4}$ *per oz.* and as $\frac{1}{4}$ is $\frac{1}{6}$ of 1*d.* $\frac{1}{2}$. I take the $\frac{1}{6}$ of the given number, the Quotient is three-halfpences, and then take the $\frac{1}{8}$ of that for Shillings, (for 1*d.* $\frac{1}{2}$ is $\frac{1}{8}$ of a Shilling) which reduce into Pounds. See the Rule.

R U L E II.

When the Price of the Integer is two Farthings, then take the third part of the given number, for so many three-halfpences, and the remainder if any, are half-pence, then take the $\frac{1}{8}$ part of that for Shillings, which reduce into Pounds, as before, see the Example following.

4867

⅓	4867 *lb.* at ½ *per lb.* *	
⅛	1622-½	
2|0	20|2-9	
£.	10-2-9½	

Or thus, *per* Rule *of* Three.

2)4867

12)2433-½

2|0)20|2-9

£. 10-2-9 ½

⅓	5734 *oz.* at ½ *per oz.*	
⅛	1911-½	
2|0	23|8-10½	
£.	11-18-11	
¼	3765 *Ells* at ½ *per Ell.*	
⅛	1252	
2|0	15|6-6	
£.	7-16-6	

* In this Example I divide by 3 and 8, (for ½ is ⅓ of 1*d.* ½, and 1*d.* ½ is ⅛ of a Shilling,) and then divide by 20 the Shillings in one Pound.

RULE III.

When the Price of the Integer is ¾, then take half the given number for three-halfpences, and if any thing remain it is 3 Farthings, then take the ⅛ for Shillings which reduce into Pounds as before, see the Examples following.

½	694 *yds.* at ¾ *per yd.*	
⅛	347	
2|0	4|3-4½	
£.	2-3-4½	

Or thus, *per* Rule *of* Three.

694

3

4)2082

12)520-½

2|0)4|3-4

£. 2-3-4 ½ as before.

½	4963 *oz.* at ¾ *per oz.*	
⅛	2481-¾	
2|0	31|0-1½	
£.	15-10-2¼ Anſ.	
½	9476 *lb.* at ¾ *per lb.*	
⅛	4738	
2|0	59|2-3	
£.	29-12-3 Anſ.	

CASE.

CASE II. RULE IV.

When the Price of the Integer, is a part or parts of Shillings, *(viz.)* Pence, divide the given number of Integers, whose value is fought, by the denomination of the Fraction, repreſenting the even Part, and the Quotient is Shillings, which reduce into Pounds as before, ſee the following Examples.

1*d*	$\frac{1}{12}$	717 *yds.* at 1*d. per yd.*	
2	0	5|9-9	
£		2-19-9 Anſ.	

In this Example the Price is one Peuny *per* Yard, therefore as a Penny is $\frac{1}{12}$ of a Shilling, I divide by 12 and 20 for Anſwer.

2*d*	$\frac{1}{6}$	579 *yds.* at 2*d. per yd.*	
2	0	9|6-6	
£		4-16-6 Anſwer.	

In this Example the Price is 2*d per* Yard, and as 2*d* it $\frac{1}{6}$ of a Shilling, I divide by 6, and then by 20 for Anſwer.

3*d*	$\frac{1}{4}$	2715*lb.* at 3*d per lb.*	
2	0	67|8-9	
£		33-18-9	

Here as the Price is 3*d. per* Pound, I divide by 4, (3*d.* being the 4*th.* of a Shilling,) and then by 20, the Shillings in a Pound for Anſ.

4*d*	$\frac{1}{3}$	3257 *Ell.* at 4*d. per E.*	
2	0	108|5-8	
£		54-5-8 Anſwer.	

Or thus, *per* Rule *of* Three.

If 1 *Ell* 4*d.* what 3257 *Ells.*

Ell.	*d.*	*Ell.*
If 1	—4—	3257
		4
	12)	13028
2	0)	108|5-8

Anſ. 54-5-8 the ſame as before.

6*d*	$\frac{1}{2}$	7496*oz.* at 6*d. per oz.*	
2	0	374|8	
£		187-8 Anſ.	

Rule

RULE V.

When the Price of the Integer is Pence, under 12, and yet not an even part, then it may be divided into even parts, and ſo the parts of the given number taken accordingly, and added together, as if it were 7, which is compoſed of the parts $\frac{1}{4}$ and $\frac{1}{3}$, *(viz.)* 3*d.* and 4*d.* wherefore firſt take $\frac{1}{4}$ of the given number, and the $\frac{1}{3}$ alſo, and add both lines together. Likewiſe 9*d* is compoſed of the parts $\frac{1}{2}$ and $\frac{1}{4}$, or 6*d.* and 3*d.* ſometimes it is more conciſe to take parts of Parts, ſuppoſe 9*d.* is the Price, firſt take $\frac{1}{2}$ for 6*d.* and then half of that half for 3*d.* becauſe 3*d.* is the half of 6*d.* and then add the two lines together, and their ſum is the Anſwer in Shillings, then reduce the Shillings into Pounds as before, ſee the following Examples.

3*d*	$\frac{1}{4}$	579*lb.* at 5*d. per lb.*	
2*d*	$\frac{1}{6}$	144-9	
		96-6	
2	0	241-3	
£.		2-1-3	Anſwer.

Here 579 the given Quantity is divided by 4 the Aliquot part that 3*d.* is of a Shilling, and then by 6 the Aliquot part that 2*d.* is of a Shilling, (for 2*d.* and 3*d.* is 5*d* the price given *per lb.*) which is added together, and then divided by 20 the Shillings in 1 Pound, for the Anſwer, obſerve the RULE.

4*d*	$\frac{1}{3}$	977 *Ells* at 7 *per Ell.*	
3*d*	$\frac{1}{4}$	325-8	
		244-3	
2	0	569-11	
£.		28-9-11	Anſwer.

6*d*	$\frac{1}{2}$	376 *Days* at 8*d. per d.*	
2*d*	$\frac{1}{6}$	188	
		62-8	
2	0	250-8	
£.		12-10-8	Anſwer.

6d	½	979*yds.* at 9*d.* *per yd.*	
3d	½	489-6	
		244-9	
2	0	73 4-3	
£.		36-14-3 Anſwer.	

6d	½	979*yds.* at 11*d.* *per yd.*	
3d	½	489-6	
2d	⅙	244-9	
		163-2	
2	0	89 7-5	
£.		44-17-5 Anſwer.	

6d	½	713*lb.* at 10*d.* *per lb.*	
4d	⅓	356-6	
		237-8	
2	0	59 4-2	
£.		29-14-2 Anſwer.	

CASE III. RULE VI.

When the Price of the Integer is Pence and Farthings, if it be an even part of a Shilling, work as has been before ſhewn, but if they are uneven, as 1*d.* ¼, 1*d.* ¾, 2*d.* ¼, or 2*d.* ¾, or the like, then firſt work for ſome even part, and then conſider what part the reſt is of that even part, and divide that Quotient thereby, then add them together and reduce them to Pounds as before, ſee the following Examples.

1d	1/12	5171*lb.* at 1*d.* ¼ *per lb.*	
¼	¼	430-11 ¼ *given No.*	
		107-8 ¾ ¼ *laſt line.*	
2	0	53 8-7 ¾	
£.		26-18-7 ¾	

1d	1/12	674*yds.* at 1*d.* ½. *	
½	½	56-2	
		28-1	
2	0	8 4-3	
£.		4-14-3 Anſwer.	

* In this Example the Price being 1*d.* ½, *per* Yard, I divide by 12 the Aliquot part that 1*d.* is of a Shilling, and that Quotient by 2, the Aliquot part that ½ is of a Penny.

d.			
1½	⅛	919*oz.* at 1*d.* ¾ *per oz.*	
¼	⅙	114-10 ½	
		19- 1 ¾	
	2|0	13| 4-0-¼	
	£	6-14-0 ¼	Anſ.
d.			
2	⅙	913 *Ells*, at 2*d.* ¼.	
¼	⅛	152-2	
		19-0 ¼	
	2|0	17| 1-2 ¼	
	£.	8-11-2 ¼	Anſwer.
d.			
2	⅙	32*lb.* at 2*d.* ½ *per lb.*	
½	¼	5-4	
		1-4	
	£.	6-8	Anſwer.

* In this Example the Price being 2*d.* ½ *per* Pound, I divide by 6 the Aliquot part that 2*d.* is of a Shilling, and that Quotient by 4 the Aliquot part ½ is of 2*d.*

See the RULE for working the Examples following.

2*d*	⅙	717*lb.* at 2*d* ¾ *per lb.*	
½	¼	119-6	
¼	½	29-10 ½	
		14-11 ¼	
	2|0	16| 4-3 ¾	
	£.	8-4-3 ¾	Anſwer.
3*d*	¼	371 *yds.* at 3*d* ¼ *per yd*	
¼	½	92-9	
		7-8 ¾	
	2|0	10| 0-5 ¾	
	£.	5-0-5 ¾	Anſ.
3*d*	¼	7841 *Miles*, at 3*d.* ½	
¼	⅙	1960-3	
		326-8 ½	
	2|0	228| 6-11 ½	
	£.	114-16-11 ½	Anſ.
3*d*	¼	357 *Ells*, at 3*d* ¾.	
¾	¼	89-3	
		22-3 ¾	
	2|0	11| 1-6 ¾	
	£.	5-11-6 ¾	Anſ.

3d	$\frac{1}{4}$	467 *Dozen*, at 4d. $\frac{1}{4}$.
1d	$\frac{1}{12}$	116.9
$\frac{1}{4}$	$\frac{1}{4}$	38-11
		9-8 $\frac{3}{4}$
	2|0	16|5-4 $\frac{3}{4}$
	£.	8-5-4 $\frac{3}{4}$ Answer.
4d	$\frac{1}{3}$	729 *Ells*, at 4d. $\frac{1}{2}$.
$\frac{1}{2}$	$\frac{1}{8}$	243
		30-4 $\frac{1}{2}$
	2|0	27|3-4 $\frac{1}{2}$
	£.	13-13-4 $\frac{1}{2}$ Answer.
3d	$\frac{1}{4}$	644 *Yards* at 4d. $\frac{3}{4}$.
$1\frac{1}{2}$	$\frac{1}{8}$	161
$\frac{1}{4}$	$\frac{1}{6}$	80-6
		13-5
	2|0	25|4-11
	£.	12-14-11 Answer.
3d	$\frac{1}{4}$	919 *Ells*. at 5d. $\frac{1}{4}$.
2d	$\frac{1}{6}$	229-9
	$\frac{1}{8}$	153-2
		19-1 $\frac{3}{4}$
	2|0	40|2-0 $\frac{3}{4}$
	£.	20-2-0 $\frac{3}{4}$ Answer.

3d		717 *Yards*, at 5d. $\frac{1}{2}$.
2d	$\frac{1}{6}$	179-3
$\frac{1}{2}$	$\frac{1}{4}$	119-6
		29-10 $\frac{1}{2}$
	2|0	32|8-7 $\frac{1}{2}$
	£.	16-8-7 $\frac{1}{2}$ Answer.
3d	$\frac{1}{4}$	477 *lb.* at 5d $\frac{3}{4}$ *per lb.*
2d	$\frac{1}{6}$	119-3
$\frac{3}{4}$	$\frac{1}{4}$	79-6
		29-9 $\frac{3}{4}$
	2|0	22|8-6 $\frac{3}{4}$
	£.	11-8-6 $\frac{3}{4}$ Answer.
3d	$\frac{1}{4}$	911 *lb.* at 6d $\frac{1}{4}$ *per lb.*
3d	$\frac{1}{4}$	227-9
$\frac{1}{4}$	$\frac{1}{12}$	227-9
		18-11 $\frac{3}{4}$
	2|0	47|4-5 $\frac{3}{4}$
	£.	23-14-5 $\frac{3}{4}$ Answe.
6d	$\frac{1}{2}$	971 *Ells*, at 6d. $\frac{1}{2}$.
$\frac{1}{2}$	$\frac{1}{12}$	485-6
		40-5 $\frac{1}{2}$
	2|0	52|5-11 $\frac{1}{2}$
	£.	26-5-11 $\frac{1}{2}$ Answer.

¼	⅓	879 *Yards*, at 6*d*. ½.
2*d*	⅙	293-0
½	¼	146-6
¼	½	36-7 ½
		18-3 ¾
	2 | 0	49 | 4-5 ¼
	£.	24-14-5 ¼ Anſwer.
4*d*	⅓	579 *lb*. at 7*d* ¼ *per lb*.
3*d*	¼	193-0
¼	1/12	144-9
		12-0 ¾
	2 | 0	34 | 9-9 ¾
	£.	17-9-9 ¾ Anſwer.
4*d*	⅛	979 *Ells*, at 7*d*. ½.
3*d*	¼	326-4
½	⅙	244-9
		40-9 ½
	2 | 0	61 | 1-10 ½
	£.	30-11-10 ½ Anſwer
4*d*	⅓	571 *Yards*, at 7*d*. ½.
3*d*	¼	190-4
¾	¼	142-0
		35-8 ¼
	2 | 0	36 | 8-9 ¼
	£.	18-8-9 ¼ Anſwer

6*d*	½	179 *Yards*, at 8*d*. ¼.
2*d*	⅙	89- 6
¼	⅛	29-10
		3- 8 ¾
	2 | 0	12 | 3-0 ¾
	£.	6.3-0 ¾ Anſwer.
6*d*	½	978 at 8*d*. ½.
2*d*	⅙	489-0
½	¼	163-0
		40-9
	2 | 0	69 | 2-9
	£.	34-12-9 Anſwer.

Or thus, *per* Rule *of* Three.

	d.	
If 1	8 ½	978
	4	34
	34	3912
		2934
		4)33252
		12)8313
		2 | 0)69 | 2-9

Anſ. 34-12-9
the ſame as before.

716

4d	1/3	719lb. at 8d 3/4 per lb	
3d	1/4	239-8	
1 1/2	1/8	179-9	
1/4	1/6	89-10 5/12	
		14-11 3/4	
2	0	52	4-3 1/4
£.		26-4-3 1/4	Anſwer.

5d	1/2	719lb. at 9d 3/4 per lb.	
3d	1/4	359-6	
3/4	1/4	179-9	
		44-11 1/4	
2	0	58	4:2 1/4
£.		29-4-2 1/4	Anſwer.

6d	1/2	916lb. at 9d 1/4 per lb.	
3d	1/4	458-0	
1/4	1 1/2	229-0	
		19-1	
2	0	70	6-1
£.		35-6-1	Anſwer.

4d	1/3	717 Ells. at 10d. 1/4.	
2d	1/2	239-0	
1d	1/4	179-3	
	1/2	179-3	
		14-11 1/4	
2	0	61	2-5 1/4
£.		30-12-5 1/4	Anſwer.

6d	1/2	835 Yards, at 9d. 1/2.	
3d	1/4	417-6	
1/2	1/6	208-9	
		34-9 1/2	
2	0	66	1-0 1/2
£		33-1-0 1/2	Anſwer.

4d	1/3	917 Ells, at 10d. 1/2.	
4d	1/3	305-8	
2d	1/6	305-8	
1/2	1/4	152-10	
		38-2 1/2	
2	0	80	2-4 1/2
£.		40-2-4 1/2	Anſwer.

6d	½	377 *Yards*, at 10*d* ¾		4d	⅓	993 *Yards*, at 11*d* ½.	
3d	¼	138-6		4d	⅓	331-0	
1½	⅛	19-3		3d	¼	331-0	
¼	1/6	109-7 ½		½	1/6	248-3	
		18-3 ¼				41-4 ½	
	2|0	78|5-7 ¾			2|0	95|1-7 ½	
	£.	39-5-7 ¾ Anſwer.			£.	47-11-7 ½ Anſwer.	
4d	⅓	571 *Dozen*, at 11*d* ¼.		4d	⅓	976 *Yards*, at 11*d* ¾.	
4d	⅓	190-4		4d	⅓	325-4	
3d	¼	190-4		3d	¼	325-4	
¼	½	142-9		¾	¼	244-0	
		11-10 ¾				61-0	
	2|0	63|5-3 ¾			2|0	95|5-8	
	£.	26-15-3 ¾ Anſwer.			£.	47-15-8	

CASE IV. RULE VII.

When the Price of the Integer is 2*s*. then cut off the figure in the place of Units of the given number, and double it for Shillings, and the figures on the other hand are Pounds, ſee the following Examples,

	71 | 3*yds*. at 2*s*. *pe*. *yd*	
	2	
£.	71-6	

Or thus, *per* Rule *of* Three.

Yards.
713
2 Shillings.

2\|0)142\|6

£. 71-6 Anſwer.

	97	6*lb.* at 2*s.* *per lb.*		64	8*lb.* at 2*s.* *per lb.*
		2			2
£.	97-12	Anſwer.	£.	64-16	Anſwer.
	83	9 *Ells.* at 2*s.* *per.*		74-7	*Ells*, at 2*s.*
		2			2
£.	83-18	Anſwer,	£.	74-14	Anſwer.
	77	7 *Feet*, at 2*s.*		655	6*yds.* at 2*s.*
		2			2
£.	77-14	Anſwer.	£.	655-12	Anſwer.

RULE VIII.

When the Price is any number of Pence above a Shilling, and not 2*s.* let the given Quantity ſtand as Shillings, and take even parts for the Pence, and ſet the Quotient underneath in proper order, without drawing a line, and add it to the given number, and the total will be the Anſwer in Shillings, which reduce into Pounds as before, ſee the following Examples.

1d	$\frac{1}{2}$	1281 *yds* at 1s. 1d. $\frac{1}{4}$.	
$\frac{1}{4}$	$\frac{1}{4}$	106-9 $\frac{1}{2}$ *given No.*	
		26-8 $\frac{1}{4}$ $\frac{1}{4}$ *laſt line.*	
	2 | 0	141 | 4-5 $\frac{1}{4}$	
	£.	70-14-5 $\frac{1}{4}$ Anſwer.	

In this Example the Price is 1s. 1d. $\frac{1}{4}$ *per* Yard, therefore (as *per* RULE) I let the given Quantity ſtand as Shillings, and take parts for the Pence and Farthings, ſee all the Examples following in this RULE.

And for a Proof of this *per* RULE *of* THREE, proceed thus.

Yd.	s.	d.	*Yards.*
If 1	—	1 $\frac{1}{4}$	— 1281
12			53
13			3843
4			6405
53			4)67893
			12)16973-$\frac{1}{4}$
			2|0)141|4-5

Anſ. as before 70-14-5 $\frac{1}{4}$

1d	$\frac{1}{2}$	6100*lb.* at 1s. 1d. $\frac{1}{2}$	
$\frac{1}{2}$	$\frac{1}{2}$	508-4	
		254-2	
	2 | 0	686 | 8-6	
	£.	343-2-6 Anſwer.	

d.			
$1\frac{1}{2}$	$\frac{1}{2}$	7904 *Ells*, at 1s 1d $\frac{3}{4}$	
$\frac{1}{4}$	$\frac{1}{6}$	988	
		164-8	
	2 | 0	905 | 6-8	
	£.	452-16-8 Anſwer.	

2d	$\frac{1}{6}$	3291*lb.* at 1s. 2d. $\frac{1}{4}$.	
$\frac{1}{4}$	$\frac{1}{2}$	548-6	
		68-6 $\frac{1}{2}$	
	2 | 0	390 | 8-0 $\frac{1}{2}$	
	£.	195-8-0 $\frac{1}{2}$ Anſwer.	

2d	$\frac{1}{6}$	9254*lb* at 1s. 2d $\frac{1}{2}$.	
$\frac{1}{2}$	$\frac{1}{4}$	1542-4	
		385-7	
	2 | 0	1118 | 1-11	
	£.	559-1-11 Anſwer.	

1d 1/12 | 7250yds. at 1s. 2d. 3/4.
1 1/2 1/8 | 604-2
1/4 1/6 | 906-3
151-0 1/2
2|0 | 891 | 1-5 1/2
£. 445-11-5 1/2 Answer.

3d 1/4 | 5325 Ells. at 1s 3d 1/4.
1/4 1/12 | 1581-3
131-9 1/4
2|0 | 803 | 8-0 1/4
£. 401-18-0 1/4 Answer.

3d 1/4 | 527 lb. at 1s 3d 1/2.
1/2 1/6 | 1317-9
219-7 1/2
2|0 | 680 | 8-4 1/2
£. 340-8-4 1/2 Answer.

3d 1/4 | 3254oz. at 1s 3d 1/4.
3/4 1/4 | 810-6
203-4 1/2
2|0 | 427 | 0-10 1/2
£. 213-10-10 1/2 Anf.

2d 1/6 | 3270lb. at 1s. 4d. 1/4.
2d 1/6 | 545-0
1/4 1/8 | 545-0
68-1 1/2
2|0 | 442 | 8-1 1/2
£. 221-8-1 1/2 Answer.

4d 1/3 | 1059lb. at 1s. 4d. 1/2.
1/2 1/8 | 2353-0
294-1 1/2
2|0 | 970 | 6-1 1/2
£. 485-6-1 1/2 Answer.

3d 1/4 | 2750 Ells. at 1s 4d 1/2.
1 1/2 1/8 | 687-6
1/4 1/6 | 343-9
57-3 1/2
2|0 | 383 | 8-6 1/2
£. 191-18-6 1/2 Answer

3d 1/4 | 7250lb. at 1s. 5d. 1/4.
2d 1/6 | 1812-6
1/4 1/8 | 1208-4
151-0 1/2
2|0 | 1042 | 1-10 1/2
£. 521-1-10 1/2 Anſ.

4d	1/3	25970z. at 1s. 5d. 1/2.
1 1/2	1/8	865-8
		324-7 1/2
	2 | 0	378 | 7-3 1/2
	£.	189-7-3 1/2 Anſwer.

4d	1/3	7210lb. at 1s 5d 3/4.
1 1/2	1/8	2403-4
1/4	1/6	901-3
		150-2 1/2
	2 | 0	1066 | 4-9 1/2
	£.	533-4-9 1/2 Anſwer.

4d	1/3	7103 Groſs at 1s 6d 1/4.
2d	1/6	2367-8
1/4	1/8	1183-10
		147-11 3/4
	2 | 0	1080 | 8-5 3/4
	£.	540-3-5 3/4 Anſwer.

6d	1/2	2254lb. at 1s. 6d. 1/2.
1/2	1/12	1627-0
		135-7
	2 | 0	501 6-7
	£.	250-16-7 Anſwer.

3d	1/4	7925lb. at 1s 6d 3/4.
2d	1/6	1981-3
1 1/2	1/8	1320-10
1/4	1/6	990-7 1/2
		165-1 1/4
	2 | 0	1238 | 2-9 3/4
	£.	619-2-9 3/4

4d	1/3	7210lb. at 1s 7d 1/4.
3d	1/4	2403-4
1/2	1/12	1802-6
		150.2 1/2
	2 | 0	1156 | 6-0 1/2
	£.	578-6-0 1/2 Anſwer.

4d	1/3	2310lb. at 1s. 7d. 1/2.
3d	1/4	770-0
1/2	1/6	577-6
		96-3
	2 | 0	375 | 3-9
	£.	187-13-9 Anſwer.

6d	1/2	2504yds. at 1s 7d 3/4.
1 1/2	1/8	1252-0
1/4	1/6	313-0
		52-2
	2 | 0	412 | 1-2
	£.	206-1-2 Anſwer.

6d	½	2095 *Ells*, at 1s 8d ¼	6d	½	2104 *Groſs* at 1s 9d ½.
2d	⅙	1047-5	3d	½	1052-0
¼	⅛	349-2	½	⅙	526-0
		43-7 ¾			87-8
	2 0	353 5-3 ¾		2 0	376 9-8
	£.	176-15-3 ¾ Anſwer		£.	188-9-8 Anſwer.
6d	½	7104 *doz.* at 1s 8d ½.	6d	½	7506*lb.* at 1s. 9d. ¾.
2d	⅙	3552-0	3d	½	3753
½	¼	1184-0	¼	¼	1876-3
		296-0			469-0 ¾
	2 0	1213 6-0		2 0	1360 4-3 ¾
	£.	606-16-0 Anſwer.		£.	680-4-3 ¾ Anſwer.
4d	⅓	1004*lb.* at 1s. 8d. ⅔.	6d	½	5200*yds.* at 1s 10d ¼.
3d	¼	334-8	3d	½	2600-0
1½	⅛	251-0	1d	⅓	1300-0
¼	⅙	125-6	¼	¼	433-4
		20-11			108-4
	2 0	173 6-1		2 0	964 1-8
	£.	86-16-1 Anſwer.		£.	482-1-8 Anſwer.
6d	½	1571 *Ells* at 1s 9d ¼.	6d	½	2117 *Ells* at 1s 10d ½.
3d	¼	1286-6	3d	½	1058-6
¼	1/12	642-9	½	⅛	529-3
		53-6 ¾			264-7 ½
	2 0	455 2-9 ¾		2 0	396-9-4 ½
	£.	227-12-9 ¾ Anſwer.		£	198-9 4 ½ Anſwer.

6d	½	1007lb.	at 1s 10d ¾.
3d	½	50-6	
1½	⅛	251-4 ⅛	
¼	⅙	125-10 ½	
		20-11 ¾	
	2 | 0	190 | 8-8 ¾	
	£.	95-8-8 ¾	Answer.

6d	½	1006lb.	at 1s 11d ½.
3d	½	503-0	
2d	⅙	251-3	
½	¼	167-8	
		41-11	
	2 | 0	196 | 9-10	
	£.	98-9-10	Answer.

6a	½	2105 *Ells*	at 1s 11d ¾.
3c	½	1052-6	
2a	⅓	526-3	
¾	⅛	350-10	
		43-10 ¾	
	2 | 0	407 | 8-5 ¾	
	£.	203-18-5 ¾	Answer.

6d	½	2705 *Ells*	at 1s 11d ¾.
3d	½	1352-6	
2d	⅙	676-3	
½	¼	450-10	
¼	½	112-8 ½	
		56 4 ¼	
	2 | 0	535 | 3-7 ¾	
	£.	267-13-7 ¾	Anf.

RULE IX.

When the given Price of an Integer is an even number of Shillings, then if you take ½ that even number of Shillings, and multiply the given number of Integers thereby, doubling the firſt figure of the Product, and ſetting it apart for Shillings, the reſt of the Product will be Pounds, which Pounds and Shillings are the value ſought, ſee the following Example.

2710

271 | 0 *yd.* at 6*s.* *per yd*
3

£. 813-0 Anſwer.

77 | 5 *lb.* at 8*s.* *per lb*
4

£. 310-0 Anſwer.

Or thus, *per* Rule *of* Three.

lb.
775
8

2 | 0)6200

£. 310-0 ſame as before

67 | 7 *Ells*, at 12*s.*
6

£. 406-4 Anſwer.

57 | 9 *Dozen*, at 14*s.*
7

£. 405-6 Anſwe.

69 | 9 *Groſs*, at 16*s.*
8

£. 559-4 Anſwer.

97 | 1 *Pieces*, at 18*s.*
9

£. 873-18 Anſwer.

64 | 6 *Ells*, at 20*s.*
10

£. 646-0 Anſwer.

RULE X.

When the given Price of the Integer is an odd number of Shillings, then work firſt for the the even number of Shillings by the laſt RULE, and for the odd Shillings take $\frac{1}{20}$ of the given number of Integers, and add them together, and you have the Anſwer, ſee the following Examples.

2|0| 57|7 *lb.* at 7*s. per lb.*
3

173-2
28-17 $\frac{1}{20}$ *given No*

£. 201-19 Anſwer.

Or thus, *per* Rule *of* Three.

lb.
577
7

2|0)4031 9

£. 201-19 ſame as before.

2|0 57|9 *Yards.* at 9*s*
4

231-12
28-19 $\frac{1}{20}$ *given No.*

£. 260-11 Anſwer.

2|0 271|0 *lb.* at 11*s.*
5

1355-0
135-10

£. 1490-10 Anſwer.

2|0 57|5 *C.* at 13*s.*
6

345-0
28-15

£. 373-15 Anſwer.

2|0 71|7 *Tons*, at 15*s.*
7

501-18
35-17

£. 537-15 Anſwer.

2|0 57|5 *Yards*, at 17*s.*
8

460-0
28-15

£. 488-15 Anſwer.

2|0 71|3 *Tons*, at 19*s.*
9

641-14
35-13

£. 677-7 Anſwer.

RULE XI.

When the given Price of the Integer is 5 Shillings, take $\frac{1}{4}$ of the given number, and you have the Anſwer, ſee the Examples following.

5s	¼	41 *Dozen*, at 5s.
£.		10-5 Anſwer.

Or thus, *per* Rule *of* Three.

41 *Dozen*.
5

2|0)20|5

10-5 ſame as before.

5s	¼	123 *Pound*, at 5s.
£.		30-15 Anſwer.
5s	¼	160 *Ells*, at 5s.
£.		40-0 Anſwer.
5s	¼	678 *Pounds*. at 5s.
£.		169-10 Anſwer.
5s	¼	574 *Yards*, at 5s.
£.		143-10 Anſwer.
5s	¼	67 *Ells*, at 5s.
£.		16-15 Anſwer.
5s	¼	598 *Dozen*, at 5s.
£.		149-10 Anſwer.

CASE V. RULE XII.

When the given Price of the Integer is Shillings and Pence, or Shillings, Pence, and Farthings, and an even part of a Pound, then divide the given number of Integers whoſe value you ſeek, by the denominator of that Fraction, repreſenting that even part, ſee the following Examples.

775

s. d.			s. d.		
1-8	1/12	775 *Ells*, at 1*s*. 8*d*.	2-6	1/8	571 *C*. at 2*s*. 6*d*.
		64-11 8 Anſwer.			71-7-6 Anſwer.
Or thus, *per* Rule *of* Three.			3-4	1/6	917 *Ells*, at 3*s*. 4*d*.
775					152-16-8 Anſwer.
20					
12)15500			6-8	1/3	577 *Yards*, at 6*s* 8*d*.
2|0)129|1-8					192-6-8 Anſwer.
£. 64-11-8 Anſwer.					

RULE XIII

When the given value of the Integer is Shillings and Pence, and not an even part of a Pound, yet many times it may be divided into parts, *(viz.)* 6*s*. 6*d*. is 4*s*. and 2*s*. 6*d*. for the 4*s*. work according to the ninth Rule aforegoing, and for the 2*s*. 6*d*. take the $\frac{1}{8}$ part of the given number, and add them together, then their ſum is the value required, ſee the Examples following.

s. d.			s. d.		
3-4	1/6	57 | 1 *Doz*. at 11*s* 4*d*.	2-6	1/8	717 *Yds*. at 14*s* 6*d*.
		4			6
		228-8			4304
		95-3-4 1/6 *given No*.			89-12-6 1/8 *given No*.
£.		323-11-4 Anſwer.			519-16-6 Anſwer.

s. d.			s. d.		
1-8 $\frac{1}{12}$	579 *C.*	at 15*s.* 8*d.*	3 4 $\frac{1}{6}$	519 *C.*	at 19*s.* 4*d.*
	7			8	
	405-6			4135-4	
	48-5 $\frac{1}{12}$	*given No.*		86-10 $\frac{1}{6}$	*given No.*
	£. 453-11	Anſwer.		£. 501-14	Anſwer.
2-6 $\frac{1}{8}$	579 *Ton*	at 18*s.* 6*d.*			
	8				
	463-4				
	72-7-6 $\frac{1}{8}$	*given No.*			
	£. 535-11-6	Anſwer.			

RULE XIV.

When the given Price of an Integer is Shillings and Pence, and you cannot readily divide them according to the laſt RULE, then multiply the given number (whoſe value you ſeek,) by the number of Shillings, in the price of the Integer, and then for the Pence work by the 4*th.* and 5*th.* RULES aforegoing, then add the numbers together, and their ſum is the value ſought in Shillings, which reduce into Pounds, as in the Examples following.

4*d.*	$\frac{1}{3}$	575 *Yds.*	at 4*s.* 4*d.*	3*d.*	$\frac{1}{4}$	219*lb.*	at 7*s.* 3*d.*
		4				7	
		2300				1533	
		191-8 $\frac{1}{3}$	*given No.*			54 9	
2	0	249	1-8	2	0	158	7-9
	£.	124-11-8	Anſwer.		£.	79-7-9	Anſwer.

177

6d ½	177oz.	11s. 6d.	
	11		
	1947		
	88-6		
2 | 0	203 | 5-6		
£.	101-15-6	Answer.	

6d ½	571C.	at 15s. 9d.	
3d ½	15		
	8565		
	285-6		
	142-9		
2 | 0	899 | 3-3		
£.	449-13-3	Answer.	

4d ⅓	157lb.	at 12s. 5d.	
1d 1/12	12		
	1884		
	52-4		
	13-1		
2 | 0	194 | 9-5		
£.	97-9-5	Answer.	

6d ½	577 Tons	at 18s 11d	
3d ½	18		
2d ⅙			
	10386		
	288-6		
	144-3		
	96-2		
2 | 0	1091 | 4 11		
£.	545-14-11	Answ.	

RULE XV.

When the given Price of the Integer is Shillings, Pence, and Farthings, then multiply your Integers, by the number of Shillings contained in the value of the Integer, and and for the Pence and Farthings work according to the 6th. Rule aforegoing, see the following Examples.

1d	$\frac{1}{12}$	539*yds.* at 4*s* 1*d* $\frac{1}{4}$.
		4
$\frac{1}{4}$	$\frac{1}{4}$	2156
		44-11 $\frac{1}{12}$ *given No.*
		11-2 $\frac{3}{4}$
	2|0	221|2-1 $\frac{3}{4}$
	£.	110-12-1 $\frac{3}{4}$ Answer.
4d	$\frac{1}{3}$	179 *Gals.* at 9*s* 5*d* $\frac{3}{4}$
		9
$1\frac{1}{2}$	$\frac{1}{8}$	1611
$\frac{1}{4}$	$\frac{1}{6}$	59-8
		22-4 $\frac{1}{2}$
		3-8 $\frac{3}{4}$
	2|0	169|6-9 $\frac{1}{4}$
	£.	84-16-9 $\frac{1}{4}$ Ans.

6d	$\frac{1}{2}$	711*gs.* at 17*s* 7*d* $\frac{3}{4}$
		17
$1\frac{1}{2}$	$\frac{1}{8}$	12087
$\frac{1}{4}$	$\frac{1}{6}$	355-6
		88-10-$\frac{1}{2}$
		14-9 $\frac{3}{4}$
	2|0	1254|6-2 $\frac{1}{4}$
	£.	627-6-2 $\frac{1}{4}$

CASE VI. RULE XVI.

When the given Price of the Integer is Pounds, then multigly the number of Integers, (whose value is sought) by the Price of the Integer, and the Answer is Pounds, see the following Examples.

	71 *Tons* at 7*l.*
	7
£.	497 Answer.

	642*C.* at 8*l per C.*
	8
£.	5136 Answer.

CASE.

CASE VII. RULE XVII.

When the Price of the Integer is Pounds, and Shillings, then for the Pounds work as in the laſt RULE, and for the Shillings, as in the 9*th*. and 10*th*. RULES aforegoing then add the numbers produced from them both, and the total is the value ſought, ſee the following Examples.

57 | 1*lb*. at 1*l*. 8*s*.

2

4 | 57 1
228-8 *given No.* x *by* 4, ½ *of* 8*s*.
£. 799-8 Anſwer.

57 | 5*C*. at 5*l*. 16*s*.

5

8 | 2875
460-0
£. 3335-0 Anſwer.

71 | 7 *Tons*, at 11 15 11*d*.

11

5 | 7887
15 2 0 | 358-10
35-17
8281-7 Anſwer.

5 | 7 *Doz*. at 8*l*. 19*s*.

8

9 | 456
15 2 0 | 51-6 *given No.* x 9.
2-17 1/20 *given No.*
510-3 Anſwer.

RULE XVIII.

When the Price of the Integer is Pounds, Shilling, and Pence, reduce the Pounds and Shillings, into Shillings, and Multiply the given number of Integers, by the ſaid Shillings, and then take parts for the Pence, as before; or if the Shillings and Pence make an even part, or parts of a Pound, then Multiply the Quantity by the Pounds, and take even parts of the given number for the Remainder of the Price, and add the Reſults together. Or when the Price is Shillings, above Twenty, and under Forty, you may let the Integers ſtand as Pounds, and without drawing a line, take parts for the odd Money, and add all together, ſee the following Examples.

		426*C.*	at 3*l* 12*s* 6*d*	
		72	20	
6*d*	½	852	(72)	
		2982		
		213		
2	0	3088	5	
£.		1544-5	Anſwer.	
		316 *Ton*	at 4*l* 15*s* 6*d*.	
		95	20	
6*d*	½	1580	(95)	
		2844		
		158		
2	0	3017	8	
£.		1508-18	Anſwer.	

		Dozen.	*l.* *s.* *d.*	
		462	at 6 14 3.	
		134	20	
		1841	134	
2*d*	⅙	6006		
		77		
2	0	6198	5	
£.		3099-5-0	Anſwer.	

RULE. XIX.

When the given Price of an Integer conſiſts of Pounds, Shillings, Pence, and Farthings, then work for the Shillings, Pence, and Farthings, as in the Rules aforeſaid, and find the total value of the given number, as if there was no Pounds, then work with the Pounds according to the Sixteenth Rule aforegoing. Or work with the Pounds and Shillings as in the laſt Rule, and with the Pence and Farthings as in the Sixth Rule, and add the numbers thus found together, and the ſum when reduced into Pounds is the Anſwers, ſee the following Examples,

		Tons,	l.	s.	d.
6d	½	57 at	3	17	9 ¾.
		77	20		
3d	½	399	77		
¾	¼	399			
		28-6			
		14-3			
		3-6 ¾			
2 0		443 5-3 ¾			
l.		221-15-3 ¾	Anf.		

		C.	l.	s.	d.
		21 at	5	14	7
		114	20		
		84	114		
6d	½	231			
1d	½	10-6			
¼	½	1-9			
		0-5 ¼			
2 0		240-6-8 ¼			
l.		120 6-8 ¼	Anſwer.		

		C.	l.	s.	d.
		120 at	4	7	3 ½
		87	20		
		840	87		
3d	¼	960			
½	⅙	30-0			
		5-0			
2 0		1047 5-0			
l.		523-15-0	Anſ.		

RULE XX.

When the given Quantity hath any odd Weight or Meaſure annexed to it, as ¼, ½, or ¾, ⅓, or ⅕, after you have worked as before ſhewn, then for the ¼, take ¼, of the given value of the Integer, for ½ take ½, and for ¾, firſt take ½ of the given Price, and then a ¼ of the given Price, and add them together, or take ⅝, and then ½ of that ½, and add them together will anſwer the ſame end, and will be the required value, ſee the Examples following.

	Tons.	*s.*	*d.*	
	246 ½	at 11	6.	
	11			
6*d* ½	2706			
	123			
	2-10 ½			
2|0	283|1-10 ½			
l.	141-11-10 ½	Anſ.		

	Yards.	*l.*	*d*	*d.*
	134 ½	at 1	11	6
	31	20		
	134	31		
6*d* ½	402			
	67			
	15-9			
2|0	423|6-9			
l.	211-16-9	Anſwer.		

	63 ¾ *C.*	at 12*s.* 10*d.*
	12	
	756	
6*d* ½	31-6	
d ⅓	21-0	
	6-5	
	3-2 ½	
2|0	81|8-1 ½	
l.	40-18-1 ½	Anſwer.

RULE XXI.

When the Quantity conſiſts of Hundreds, Quarters, and Pounds, find the value of the even Hundreds as before, and for the Quarters and Pounds, take the Aliquot parts of the Integer, and add all together, and the ſum will be the Anſwer, as in the following Examples.

		C. qr. lb.	l.	s.
		12 3 16 at	4	12
qr.				12
2	½			
1	½		55-	4
lb.			2-	6
16	⅓		1-	3
			0-13-	1½
		l.	59-6-	1½

		C. qr. lb.	l.	s.	d.
		25 2 14 at	3	17	6
					5
			96-	7-	6
					5
qr.					
2	½		96-	17-	6
lb.			1-	18	9
14	⅛		9-	8	¼
		£.	99-	5-	11 ¼

		C. qr. lb.	l.	s.	d.
		17 1 17 at	1	4	9
					4
qr.					
1	¼		4-	19-	0
					4
lb.					
16	⅓		19-	16-	0
			1-	4-	9
1	1/16			6	2 ½
			3-	6	¼
				2	½
		l.	21-	10-	8

		C. qr. lb.	l.	s.	d.
		72 1 18 at	4	5	8
					8
			34-	5-	4
					9
qr.					
1	¼		308-	8-	0
lb.			1-	1-	5
16	⅓		12-	2	¾
2	⅛		1-	6	¼
		l.	310-	3-	2

		C. qr. lb.	l.	s.	d.
		85 1 10 at	1	7	8
					7
			9-	13-	8
					12
qr.					
1	¼		116-	4-	0
lb.			1-	7-	8
8	1/14			6	11
2	¼		1-	11	5/8
				5	¾
		l.	118-	1-	0 ¼

BILLS of *PARCELS,*

WHEN Goods are ſold by one Perſon to another, the Particulars are wrote in a Bill, with the Price of each Pound, Yard, Ell, *&c.* and the amount at the end of the line, and when all the Particulars are ſet down, and the ſeveral ſums they come to, be placed in order one under another, Then add them together, and place the total at the Bottom. This is what is meant by a *Bill* of *Parcels*, and is generally given by every Trader to the Buyer, the form of which is as follows.

Mrs. Jane Podmore, 15*th March,* 1775.

Bought of *Humphry Hozier.*

		s.	*d.*		*l.*	*s.*	*d.*
8	Pair of Silk Stockings at	10	6	*per pr.*	4	4	0
5	——— Worſted ditto.	3	4		0	16	8
4	——— Thread ———	5	0		1	0	0
16	——— Yarn ———	1	10		1	9	4
18	——— Cotton ———	4	6		4	1	0
9	——— Womens Silk Gloves	4	3		1	18	3
20	Yards of Flannel at	1	6	*per yd.*	1	10	0
				£.	14	19	3

Simon Bateman Esq; 15*th March*, 1775.
Bought of *Roger Wineseller*.

			s.	d.		l.	s.	d.
Port Red	15	Gallons at	6	4	*per gal.*	4	15	0
Claret	20	——	9	2		9	3	4
Palm Sack	4	——	7	10		1	11	4
Lisbon white	40	——	4	3		8	10	0
Sherry	21	——	5	10		6	2	6
Rhenish	24	——	6	2		7	8	0
					£.	37	10	2

BILLS *on* *BOOK DEBTS.*

FORM of a Carpenters Bill, from the celebrated Mr. GEORGE BICKHAM's *Universal Penman*.

Conrade Dubois Esq; *Dr.*

To Henry Sims, for work and Materials, in his House at Henley-Park, Surry.

1738.		l.	s.	d.
May 18:	Oak tim. 12 *load* at 2*l.* 5*s. per Ton*,	33	15	0
— 27:	Fir tim. 35 *T* at 1*l* 12*s* 10*d a load.*	45	19	4
June 11:	Oak plank 96 *ft.* at 3*d.* $\frac{1}{2}$. *per foot*	1	8	0
— 15:	Norw. deals 590 at 6*l.* 15*s. per hd.*	33	3	9
— 29:	Sixpenny nls. 29 *tho.* at 3*s* 10*d per m.*	5	11	2
——	Ten great nls. 30*doz.* at 14*s* 10*d per*	22	5	0
July 16:	Work for self 90 *days* at 3*s* 4*d per day*	15	0	0
	—— for 1 man 90*ds.* at 2*s* 6*d. p.r day*	11	5	0
	Wainscot 73 *Yards*, at 3*s* 2*d. per yd.*	11	11	2
	Double quarter 58 *feet* at 4*d. per foot.*	0	19	4
	£.	180	17	9

☞ Deals and nails are 120 to the hundred, 50 feet are a Load, and 40 feet a Ton of Timber.

Form

Form of a Bricklayer's Bill, from the celebrated Mr. GEORGE BICKHAM.

Sir Pargiter Fleetwood Dr.

To James Mainſtone, for work and Materials in his houſe on Tower-hill, LONDON.

1738.		s.	d.	l.	s.	d.
Mar. 28.	Bricks, 25 *Thou.* at	15	7 *per M.*	19	9	7
—— 30.	Tiles, 11 ditto. at	19	5 ditto.	10	13	7
April 5.	Lime, 28 *Hun.* at	15	11 *per hun.*	22	5	8
—— 12.	Sand, 19 *load*, at	3	10 *per load.*	3	12	10
May 7.	Ridge Tiles, 149 at	8	1 *per hun.*	0	12	0
June 16.	Work for felf 90 *ds* at	3	0 *per day.*	13	10	0
	Dit labourer 90 *ds* at	1	8 *per day.*	7	10	0
	Dit. my man 90 *ds* at	2	6 *per day.*	11	5	0
			£.	88	18	8

N. B. A Brick ought to be 9 Inches long, 4 ¼ broad, and 2 ½ thick, 500 Bricks are a load, 1000 Tiles the ſame, 25 buſhels are a hundred of Lime. About 4500 Bricks will make a Rod of Brickwork, *(viz)* 272 ¼ ſquare Feet, a Brick and a half thick.

The honourable Lady Pink,

To Mary Millener Dr.

1775.		l.	s.	d.
March 12.	To fine lace 12*yds.* at 10*s* 4*d. per yd.*	6	4	0
	Flowered Ribbon 10 ½ at 8*s* 6*d.*	1	6	3
14.	Sarcenet Hoods 6 at 4*s.*	1	4	0
24.	Kid Gloves 8 *pair* at 2*s* 1*d. per pair,*	0	16	8
April 2.	Lambs dit. 2 *doz.* at 12*s. per dozen.*	1	4	0
19.	India Fans, 6 *doz.* at 4*s* 1*d. per doz.*	1	4	6
	£.	11	19	5

Mr. James Shortmeasure, Dr.
To Woolstone Winecooper.

1775.			l.	s.	d.
Mar. 12.	Palm Sack, 18 *Galls.* at 8*s.* 6*d.*		7	13	0
—— 14.	Port Red, 35 dit. at 5*s.* 4*d.*		9	6	8
—— 18.	Sherry 17 dit. at 6*s,* 6*d.*		5	10	6
—— 21.	Rhenish, 19 dit. at 6*s.* 8*d.*		6	6	8
April 7.	White Lisbon 32 *Gals.* at 4*s.* 10*d.*		7	14	8
—— 12.	Burgundy, 10 ½ *dozen,* at 50*s.*		26	5	0
—— 16.	Mountain, 7 *Galls.* at 6*s.* 2*d.*		2	3	2
—— 21.	A double cheft of Florence agreed for		4	0	0
		£.	68	19	8

SIMPLE INTEREST.

SIMPLE INTEREST, is the Profit allowed in the lending or forbearance of any fum of money, for fome determined fpace of time.

RULE I.

When the Intereft is required for a Year, multiply the Principal by the rate *per Cent,* and divide that Product by 100, the Quotient is the Intereft required.

What's the Intereft of 179*l.* for a Year, at 5*l. per Cent, per Annum.*

	l.	l.	l.
If	100	—— 5	—— 179
			5
			8|95
			20
			19|00

Anfwer 8*l.* 19*s.* 0*d.*

What's

What's the Intereſt of 97*l.* 17*s.* 6*d.* for a Year at 5*l.* *per Cent.*

l.	*l.*	*l.*	*s.*	*d.*
If 100	5	97	17	6
				5
		4	89	7 6
			20	
		17	87	
			12	
		10	50	
			4	
l.	*s.*	*d.*		
Anſ. 4	17	10½		

Note. The dividing by 100 in this and the following Examples, (where needful) is performed by cutting of the figures with a ſtraight line, to the right hand, to anſwer the 2 cyphers in 100, ſee *Page* 71.

What's the Intereſt of 257*l.* 12*s.* 9*d.* for a Year, at 6*l.* *per Cent*, *per Annum*.

l.	*l.*	*l.*	*s.*	*d.*
If 100	6	257	12	9
				6
		15	45	16 6
			20	
		9	16	
			12	
		11	98	
			4	
		¾	92	

Anſwer, 15*l.* 9*s.* 11*d.* ¾.

What's the Intereſt of 220*l.* for a Year, at 4*l.* *per Cent*, *per Annum*.

l.	*l.*	*l.*
If 100	4	220
		4
		8 80
		20
		16 00

Anſ. 8*l.* 16*s.* 0*d.*

RULE II.

When the Intereſt is required for 2, 3, 4, 5, *&c.* years, multiply the Intereſt for 1 year, by the number of years given in the Queſtion, the Product will be the Anſwer.

What's the Intereſt of 139*l.* 17*s.* 6*d.* for 5 Years, at 5*l.* *per Cent*, *per Annum*.

	l.	*l.*	*l.*	*s.*	*d.*
If	100	5	139	17	6

5

6 | 99 7 6

20

19 | 87

12

10 | 50

4

½ | 00

l.	*s.*	*d.*	
6	19	10	½
		5	*No. of Years,*
34	19	4	½ Anſwer.

What's the Intereſt of 96*l* 12*s* 9*d.* for 4 Years, at 6*l.* *per Cent*, *per Annum*.

	l.	*l.*	*l*	*s.*	*d.*
If	100	6	96	12	9
					6

5 | 79 16 6

20

15 | 96

12

11 | 58

4

½ | 32 *remai.*

l.	*s.*	*d.*	
5	15	11	½
No of yrs.		4	
23	3	10	

What's the Amount of 400*l.* for 12 Years, at 6*l.* *per Cent*, *per Annum*.

	l.	*l.*	*l.*
If	100	6	400
	l.		6
	24		
	12 *No. of Yrs.*		24 | 00
	288		
	400		
	688		

Anſ. 688*l.* 0*s.* 0*d.*

RULE III.

When the Intereſt is required for any number of Years, with ¼, or ½, or ¾, of a Year, firſt find the Intereſt for the number of Years required, as if there were no Quarters of a Year, then for ¼, take one fourth of the Intereſt for one Year; for ½, take half of the Intereſt for 1 Year, for ¾, take the parts compounded of ¾, and add them to the Intereſt for the reſt of the Time, the ſum will be the Intereſt required.

What's

What's the Intereſt of 468*l.* for 4 ¼ Years, at 6*l.* *per Cent, per Annum.*

	l.	*l.*	*l.*
If 100	—— 6 ——	468	
l. s. d.		6	
28 1 7			
4 *No. of Years.*		28 08	
		20	
112 6 4			
7 0 4 ¾ ¼ *of yrs. Int.*		1 60	
		12	
119 6 8 ¾ Anſ.			
		7 20	

What's the Intereſt of 112*l* 10*s* 4*d*, for 5 ½ Years, at 6*l.* *per Cent, per Annum.*

	l.	*l.*	*l. s. d.*
If 100	—— 6 ——	112 10 4	
l. s. d.		6	
6 15 0			
5 *No. of Years.*		6 75	2 0
		20	
33 15 0			
3 7 6 *half yrs Int.*		15 02	
37 2 6 Anſwer.			

What's the Intereſt of 200*l.* for 3 ¾ Years, at 5*l.* *per Cent, per Annum,*

	l.	*l.*	*l.*
If 100	—— 5 ——	200	
l. s.		5	
10 0			
3 *No. of yrs.*		10 00	
30 0			
5 0	½ *Years Intereſt.*		
2 10	¼ *Years Intereſt.*		
37 10 Anſwer.			

What's the Intereſt of 1000*l.* for 2 ½ Years, at 4*l.* *per Cent, per Annum.*

	l.	*l.*	*l.*
If 100	—— 4 ——	1000	
l.		4	
40			
2 *No. of yrs.*		40 00	
80	*Intereſt for 2 Years.*		
20	*Intereſt for ½ a Year.*		
10	*Intereſt for ¼ a Year.*		
110 Anſwer.			

RULE IV.

When the Intereſt is required with ¼, ½, or ¾, more than the Pounds given in the rate, multiply the Principal by the Pounds in the rate *per Cent* as before, and let the parts for ¼, or ½, or ¾, be taken from the Principal, and added to that Product.

What's the Intereſt of 400*l.* for 2 Years, at 5 ½*l.* *per Cent, per Annum.*

l.	*l.*	*l.*
If 100	5 ½	400
		5
		20|00
		2 00
		22|00
		2 *Years.*
	Anſwer	44

What's the Intereſt of 120*l.* for a Year, at 4 ½*l.* *per Cent, per Annum.*

l.	*l.*	*l.*
If 100	4 ½	120
		4
		480
		60
		5|40
		20
	Anſ. 5*l.* 8*s.*	8|00

What's the Amount of 690*l.* for 3 Years, at 4 ¼*l.* *per Cent, per Annum.*

l.	*l.*	*l.*
If 100	4 ¼	690
		4
		2760
		172 10
		29|32 10
		20
		6|50
		12
		6|00

l.	*s.*	*d.*
29	6	6
		3
87	19	6
690	0	0
£. 777	19	6

Anſwer, 777*l.* 19*s.* 6*d.*

What's

What's the Amount of 120*l*. 10*s* for 2 $\frac{1}{2}$ Years, at 4 $\frac{3}{4}$*l*. *per Cent*, *per Annum*.

l. *l*. *l*. *s*.

If 100—4 $\frac{3}{4}$—120 10

4

482 0 *Sum*
60 5 $\frac{1}{2}$ *of the*
30 2 6 $\frac{1}{4}$ *dit*.

5|72 7 6
20

14|47
12

5|70
4

$\frac{1}{2}$|80

l. *s*. *d*.
5 14 5 $\frac{1}{2}$
2 *No. of Years*.

11 8 11
2 17 2 $\frac{3}{4}$ $\frac{1}{2}$ *of the Int*.
120 10 0 *Principal*.

134 16 1 $\frac{3}{4}$ Anſwer.

What's the Intereſt of 300*l*. for 5 $\frac{3}{4}$ Years, at 3 $\frac{3}{4}$*l*. *per Cent*, *per Annum*.

l. *l*. *l*.

If 100—3 $\frac{3}{4}$—300

3

900 *l*.
150 $\frac{1}{2}$ *of* 300
75 $\frac{1}{4}$ *of dit*.

11|25
20

5|00

l. *s*. *d*.
11 5 0
15 *No. of Yrs*.

56 5 0
5 12 6 $\frac{1}{2}$ *Int*. 1 *yr*.
2 16 3 $\frac{1}{4}$ *of dit*.

64 13 9 Anſ.

RULE V.

When the Intereſt is required for Months, Divide the Intereſt of the given Principal for one Year, by the Aliquot parts of 12.

What's the Intereſt of 371*l* 17*s* 6*d*. for 4 Months, at 5*l*. *per Cent*, *per Annum*.

	l.	*l.*	*l.*	*s.*	*d.*
If 100	—— 5	——	371	17	6
		ſecond No.	5		
			18	59	7 6
				20	
			11	87	
				12	
Mon.	*l.*	*s.*	*d.*		
4-⅓	18	11	10½	10	50
					4
Anſ.	6	3	11½	½	00

What's the Intereſt of 87*l* 7*s* 6*d*. for 8 Months, at 5*l*. *per Cent*, *per Annum*.

	l.	*l.*	*l.*	*s.*	*d.*
If 100	—— 5	——	87	7	6
		Sec. No.	5		
			4	36	17 6
				20	
			7	37	
				12	
Mon.	*l.*	*s.*	*d.*		
4⅓	4	7	4½	4	50
4⅓	1	9	1½		
	1	9	1½		
					4
Anſ.	2	18	3	½	00

What's the Intereſt of 159*l*. 15*s*. 9*d*. for 11 Months, at 5*l*. *per Cent*, *per Annum*.

	l.	*l.*	*l.*	*s.*	*d.*
If 100	—— 5	——	159	15	9
					5 *2nd. No.*
			7	98	18 9
				20	
Mon.	*l.*	*s.*	*d.*		
6—½	7	19	9¼		
3—½	3	19	10½	19	78
2—⅙	1	19	11¼		12
	1	6	7½		
				9	45
Anſ.	7	6	5¼		4
				¼	80

RULE VI.

When the Intereſt is required for any number of weeks, it muſt be work'd by two ſtatings in the *Rule* of *Three*.

One of the Weeks are to the Intereſt of the given Sum for a Year, ſo are the Weeks given to the Intereſt required.

What's

What's the Intereſt of 400*l.* for a Week, at 5*l.* *per Cent, per Annum.*

l. *l.* *l.*
If 100——5——400
5
20|00

Weeks. *l.* *Week.*
If 52——20——1
20
52)400(7*s.*
364
36
12
52)432(8*d.*
416
16
4
52)64($\frac{1}{4}$
52
12
Anſ. 7*s.* 8*d.* $\frac{1}{4}$.

What's the Intereſt of 126*l.* 12*s.* for 16 Weeks, at 4 $\frac{1}{2}$*l.* *per Cent, per Annum.*

l. *l.* *l.* *s.*
If 100——4 $\frac{1}{2}$——126 12
4
506 8
63 6
5|69 14
20
13|94
12
11|28
4
$\frac{1}{4}$|12

Weeks *l.* *s.* *d.* *Weeks.*
If 52——5 13 11 $\frac{1}{4}$——16
20
113
12
1367
4
5469
3*d.* *No.* 16 4)
52)87504(1682
52
355 12)420-$\frac{1}{2}$
312 2|0)3|5-0
430 1-15-0 $\frac{1}{2}$ Anſ.
416
144
104
40

What's the Amount of 500*l.* for twenty Weeks, at 3 ½*l. per Cent, per Annum.*

l.	*l.*	*l.*
If 100	3 ½	500
		3
		1500
		250
		17|50
		10|00

Weeks.	*l.*	*s.*	*Weeks.*
If 52	17	10	20
	20		
	350		
	12		
	4200		
	20		
	12)		
52)84000(	1615		
52			
	2|0)13|4-7		
320			
312	6-14-7 ¼		
	500 *given No.*		
80			
52	506-14-7 ¼ Anſ.		
280			
260			
20			
4			
52)80(¼			
52			
28			

Anſwer. 506*l.* 14*s.* 7*d.* ¼.

RULE

RULE VII.

When the Intereſt is required for Days, bring the Principal money into Pence, and multiply it by the Days it is out at Intereſt, and divide by 6083 for 6*l. per Cent.* by 6636 for 5 ½*l.* by 7300 for 5*l.* by 8111 for 4 ½*l.* by 9125 for 4*l.* by 10428 for 3 ½*l.* and by 12166 for 3*l.* which are the Days in a Year multiply'd by 100, and divided by the Rate of Intereſt, for which ſee a few Examples below.

Suppoſe for 5*l. per Cent.*

Days
365 *
100
5)36500
7300

Suppoſe for 6*l. per Cent.*

Days.
365 *
100
6)36500
6083

Suppoſe for 4 ½*l. per Cent.*

Days.
365 *
100

45)36500(8111
360
50
45
50
45
50
45
5

* And ſo of the reſt.

What's

What's the Intereſt of 120*l* for 126 Days, at 4*l*. *per Cent. per Annum.*

See the ſame Example work'd from Pounds.

l.
120
20
2400
12
28800
126 *Days.*
172800
345600
12)
9125)3628800(—397
27375
2|0)3|3-1
89130
82125 £. 1-13-1 ½ Anſ.
70050
63875
6175
4
9125)24700(½
18250
6450

Days.
126
120
9125)15120(1*l.*
9125
5995
20
9125)119900(13*s.*
9125
28650
27375
1275
12
9125)15300(1*d.*
9125
6175
4
9125)24700(½
18250
6450

Anſwer. 1*l.* 13*s.* 1*d.* ½.

What's

What's the Intereſt of 126*l.* for 145 Days at 6*l* *per Cent, per Annum,*

Days.
145
126
870
1740
6083)18270(3*l.*
18249
21
20
420
12
5040
4
6083)20160($\frac{3}{4}$
18249
1911

Anſ. 3*l.* 0*s.* 0*d.*-$\frac{3}{4}$.

What's the Intereſt of 100*l.* from *June* 1*ſt.* 1774. to *March* 9*th* 1775, at 5*l.* *per Cent per An.*

	Days.
June	30
July	31
Aug.	31
Sep.	30
Oct.	31
Nov.	30
Dec.	31
Jan.	31
Feb.	28
March	9
Days	282

l.
100
282 *days.*
200
800
200
73|00)282|00(3*l.*
219
63
20
73)1260(17*s.*
73
530
511
19
12
73)228(3*d.*
219
9
4
36

Anſ. 3*l.* 17*s.* 3*d.*

Factors

FACTORS Allowances.

Commonly call'd *Commiſſion* or *Proviſion.*

COMMISSION or PROVISION is an allowance from Merchants, to their Factors or Agents beyond the Sea, in the buying or ſelling of any ſort of Goods. and is a certain Rate *per Cent*, according to the cuſtom of the Country where the Factor reſides.

My Factor ſends me word that he has bought Goods to the value of 500*l* 13*s* 6*d*. upon my Account, I demand what his Commiſſion comes to at 3 $\frac{1}{2}$*l*. *per Cent.*

l.	*s.*	*d.*	
500	13	6	
		3	
1502	0	6	
250	6	9	$\frac{1}{2}$ *the value of the Goods.*
17|52	7	3	
20			
10|47			
12			
5|67			
4			
$\frac{1}{2}$|68			

Anſ. 17*l*. 10*s*. 5*d*. $\frac{1}{2}$.

My Correſpondent has diſburſed upon my Account, the ſum of 1009*l* 18*s*. what muſt he demand for his Commiſſion, when I allow him 2 $\frac{1}{4}$*l*. *per Cent.*

l.	*s.*	*d.*
1009	18	0
		2
2019	16	2
252	9	6
22|72	5	6
20		
14|45		
12		
5|46		
4		
$\frac{1}{4}$|84		

Anſ. 22*l*. 14*s*. 5*d*. $\frac{1}{4}$.

Suppoſe

Suppoſe I allow my Correſpondent 1 ¾*l. per Cent*, for Proviſion, what may he demand on the diſburſment of 704*l.* 15*s.* 4*d.*

l.	*s.*	*d.*	
704	15	4	
		1	
704	15	4	
352	7	8	
176	3	10	
12|33	6	10	
20			
6|66			
12			
8|02			

Note In this Example, for ¼, I have taken a half and fourth of the Sum.

Anſwer, 12*l.* 6*s.* 8*d.*

BROKAGE.

BROKAGE is an allowance made to Brokers, or any Perſon who is employed to aſſiſt others in buying, or diſpoſing of their Goods, and in LONDON are not to act without the LORD MAYOR's *Licence*.

RULE.

To find the Brokage of any ſum, divide the given ſum by 100, and take parts from the Quotient, by the rate *per Cent*.

What

* What is the Brokage tell me true,
Of what you in the the Margin view, †
Allowing Seventy-pence, ‡ not more,
Ingenious *Tyro* this con o'er.

l.	*s.*	*d.*
10	00	10 6
	20	
0	10	
	12	
1	26	
	4	
¼	04	

	l.	*s.*	*d.*
Rate 5*s.*—¼	10	0	1 ¼
per Cent. 10*d.*—⅙	2	10	0 ¼
	0	8	4
£.	2	18	4 ¼

l.	*s.*	*d.*
1000	10	6

‡ *per Cent.*

* The above Example is taken from *Sadler's Arithmetic*.

What may a Broker demand for Brokage, when he sells Goods to the value of 500*l.* 10*s.* 7*d.* and I allow him 7*s.* *per Cent.*

l.	*s.*	*d.*
5	00	10 7
	20	
0	10	
	12	
1	27	
	4	
¼	08	

	l.	*s.*	*d.*
5*s.*—¼	5	0	1 ¼
2*s.*—$\frac{1}{10}$	1	5	0 ¼
	0	10	0
	1	15	0 ¼ *£.*

Answer, 1*l.* 15*s.* 0*d.* ¼.

What

What is the Brokage of 700*l*, 14*s*. 6*d*. at 4*s*. *per Cent*.

l.	*s*.	*d*.
7 | 00	14	6
	20	
0 | 14		
	12	
1 | 74		
	4	
½ | 96		

	l.	*s*.	*d*.
4*s*.—⅕ |	7	0	1 ½
Anſ.	1	8	0 ¼

Suppoſe I employ a Broker, who ſells Goods to the value of 909*l*. 14*s*. 10*d*. what is the Brokage at 6*s*. 6*d*. *per Cent*.

l.	*s*.	*d*.
9 | 09	14	10
	20	
1 | 94		
	12	
11 | 38		
	4	
¼ | 52		

		l.	*s*.	*d*.
Rate *per Cent*.	4*s*.——⅕ |	9	1	11 ⅕
	2*s* 6*d*.—⅛ |	1	19	4 ½
		1	2	8 ¼
	£.	2	19	1 ¼ Anſ.

N. B. If the Brokage ſhould be 1*l*. or more *per Cent*. the operation will be the ſame with that in Factor's Allowances.

Inſurance

INSURANCE.

IS ſecurity given by Perſons who oblige themſelves to anſwer for the loſs or damage of Ships, Houſes, Goods, *&c.* by Storms, Pirates, Fire, *&c.* in conſideration of a Premium paid down, to reſtore whatſoever value the Premium is advanced for, by the Proprietors of the thing Injured.

RULE.

Divide the given Sum by 100, and then proceed as in Brokage, for which ſee Page 221.

Suppoſe I make an Inſurance of Goods *&c.* to the value of 4960*l.* at 4*s.* 6*d.* *per Cent*, what doth the Inſurance come to.

l.		*l.*	*s.*	*d.*
49|60	4*s.*—$\frac{1}{5}$	49	12	0
20				
—	6*d.*—$\frac{1}{8}$	9	18	$4\frac{3}{4}$
12|00		1	4	$9\frac{1}{2}$
—				
	l.	11	8	$2\frac{1}{4}$ Anſ.

Stocks.

STOCKS.

ARE the public Funds of the Nation, the ſhares whereof are Tranſferable from one Perſon to another, and occaſion that extenſive Buſineſs called Stock-Jobbing, or (as Mr. HUTTON in his *Schoolmaſter's Guide* juſtly remarks) the worſt kind of Gaming.

What is the purchaſe of 460*l.* *South-Sea-Stock*, at 116*l.* 4*s.* *per Cent.*

	l.
	460
	16
4*s.*—$\frac{1}{5}$	7360
	92
£. *	74 52
	20
	10 40
	12
	4 80
	4
	$\frac{4}{5}$ 20

	l.	*s.*	*d.*
To	460	0	0
add *	74	10	4 $\frac{4}{5}$
Anſ.	534	10	4 $\frac{4}{5}$

Compound

Compound INTEREST.

COMPOUND INTEREST, or INTEREST upon INTEREST, is when a Perſon that has borrowed a ſum of money, and can neither pay off the Principal nor Intereſt, conſents that as the Intereſt becomes due, it ſhall become a Principal, and ſo both the Principal and Intereſt continually increaſes; but this is ſeldom uſed, otherwiſe than in the buying Annuities, places for life, or Eſtates.

RULE.

Find the amount of the given ſum by *Simple Intereſt* for the firſt Year, which is the Principal for the ſecond Year, then find the amount of that Principal for the ſecond Year, and that is the Principal for the third Year, and ſo on for any number of Years given, and you have the amount, when the *Compound Intereſt* is required, ſubtract the given ſum from the laſt amount, and the remainder is the *Compound Intereſt* required.

What

What sum will 450*l.* amount to in 3 Years, at 5*l.* *per Cent*, *per Annum*, *Compound Interest*.

l.	*l.*	*l.*
If 100	—5	—450
		5
		—
	22	50
		20
		—
	10	00

	l.	*s.*	
add	450	0	Sum put out.
	22	10	
	472	10	1*st.* year's amount.

l.	*l.*	*l.*	*s.*
If 100	—5	—472	10
			5
			—
	23	62	10
		20	
		—	
	12	50	
		12	
		—	
	6	00	

	l.	*s.*	*d.*	
add	472	10	0	
	23	12	6	
	496	2	6	2*d yrs. Am.*

l.	*l.*	*l.*	*s.*	*d.*
If 100	—5	—496	2	6
				5
				—
	24	80	12	6
		20		
		—		
	16	12		
		12		
		—		
	1	50		
		4		
		—		
	½	00		

	l.	*s.*	*d.*	
add	496	2	6	
	24	16	1 ½	
	520	18	7 ½	3*d. yrs. Amount.*

Anſwer, 520*l.* 18. 7*d.* ½.

What

What will 500*l.* amount to in 4 Years, at 4 $\frac{1}{4}$*l. per Cent, per Annum, Compound Intereſt.*

l.	*l.*	*l.*
If 100	4 $\frac{1}{4}$	500
		4
		2000
$\frac{1}{4}$ *given No.*		125
		21 | 25
		20
		5 | 00

add { 500 0 / 21 5 } *firſt Years Intereſt.*

521 5 *firſt Years Amount.*

l.	*l.*	*l.*	*d.*
If 100	4 $\frac{1}{4}$	521	5
			4
		2085	0
$\frac{1}{4}$ *given No.*		130	6 3
		22 | 15	6 3
		20	
		3 | 06	
		12	
		0 | 75	
		4	
		$\frac{3}{4}$ | 00	

l.	*s*	*d.*	
521	5	0	
22	3	0	$\frac{3}{4}$
543	8	0	$\frac{3}{4}$

add { 521 5 0 / 22 3 0 $\frac{3}{4}$ } 2*d. yrs. Amount.*

If

	l.	l.	l.	s.	d.
If	100	4 ¼	543	8	0 ¾
					4

2173	12	3
135	17	0

23 | 09	9	3
20		
1 | 89		
12		
10 | 71		
4		
½ | 84		

l.	s.	d.	
543	8	0	¾
23	1	10	½
566	9	11	¼ 3d. *Years Amount.*

	l.	l.	l.	s.	d.
If	100	4 ¼	566	9	11 ¾
					4

2265	19	9
141	12	5 ¾

24 | 07	12	2 ¾
20		
1 | 52		
12		
6 | 26		
4		
¼ | 70		

l.	s.	d.	
566	9	11	¼
24	1	6	¼
590	11	5	½

Anſwer. 590*l.* 11*s.* 5*d.* ½.

What's the *Compound Intereſt* of 400*l.* 10*s.* for 3 years, at 3 $\frac{1}{2}$*l. per Cent. per Annum.*

l.	*l.*	*l.*	*s.*
If 100	3 $\frac{1}{2}$	400	10
			3
		1201	10
		200	5
		14	01 15
			20
		0	35
			12
		4	20
			4
			80

l.	*s.*	
400	10	
14	0	4
414	10	4 *1ſt. Years Amount.*

l.	*l.*	*l.*	*s.*	*d.*
If 100	3 $\frac{1}{2}$	414	10	4
				3
		1243	11	0
		207	5	2
		14	50 16	2
			20	
		10	16	
			12	
		1	94	
			4	
		$\frac{3}{4}$	76	

l.	*s.*	*d.*	
414	10	4	
14	10	1	$\frac{3}{4}$
429	0	5	$\frac{1}{4}$ *2d. Years Amount.*

If

	l.	l.	l.	s.	d.
If	100	3 ½	429	0	5 ¾
					3
			1287	1	5 ¼
			214	10	2 ¾

l.	s.	d.	
429	0	5 ¾	
15	0	3 ¼	
444	0	9 ½	*Amount.*
400	10	0	
£. 43	10	9 ½	*Intereſt.*

15	01	11 8
	20	
0	31	
	12	
3	80	
	4	
¾	20	

REBATE.

IS to Discount or repay money before the time agreed upon, for which the receiver allows the payer ſo much as the Intereſt of the ſum paid would amount to, at the rate agreed upon, for the time the Note or Contract is yet unexpired.

RULE I.

Firſt add the ſum you agree to rebate *per Cent*, to 100*l.* for the firſt number in the *Rule* of *Three*, and the Sum you rebate *per Cent*, for the ſecond number, and the Principal value of the Goods for which you make rebate, muſt be the third Term in the *Rule* of *Three*.

What's the rebate of 179*l.* 18*s.* 8*d.* for a Year, at 5*l.* *per Cent, per Annum.*

l.	*l.*	*l.*	*s.*	*d.*
If 105	5	179	18	8
20		20		
2100		3598		
12		12		
25200		43184		
		5		

25200)215920(8*l.*
201600

14320
20

25200)286400(11*s.*
25200

34400
25200

9200
12

25200)110400(4*d.*
100800

9600
4

25200)38400(¼
25200

Remains 13200

Answer, 8*l.* 11*s.* 4*d.* ¼.

RULE

RULE II.

When it is required to know what prefent money will difcharge a debt, firft find the Intereft of 100*l.* for the time given it is to be put out to Intereft, which add to the 100*l.* for the firft number, in the *Rule* of *Three*, and 100*l.* the fecond number, and the fum given muft be the third number.

Or, As 12 months are to the rate *per Cent*, fo is the time propos'd to a fourth number.

2*d*. Add that fourth number to 100*l.*

3*d*. As that fum is to the fourth number, fo is the given fum to the Rebate.

4*th*. Subtract the Rebate from the given fum, and the remainder is the prefent worth.

Or thus. 3*d*. As that fum is to 100*l.* fo is the given fum to the prefent payment.

4*th*. Subtract the prefent worth from the given fum, and the remainder is the Rebate.

What is the Rebate of 795*l.* 11*s.* 2*d.* for 11 Months, at 6*l.* *per Cent.*

l.	*s.*	*l.*	*s.*	*l.*	*s.*	*d.*
If 105	10	——5	10	——795	11	2
20		20		20		
2110		110		15911		
12				12		
25320				190934		
				110		
				2|0)		
				25320)2100740(—82|9		
				202560		
				74674		
				50640		
				240340		
				227880		
				12460		
				12		
				25320)149520(5*d.*		
				126600		
				22920		
				4		
				25320)91680(¾		
				75960		
				15720		

l. 41-9-5 ¾ Answer.

Mon.	*l.*	*Mon.*
If 12	—6—	11
		6
12|	66	
		5—6
		20
12|	120	
		10

Answer, 41*l.* 9*s.* 5*d.* ¾.

What's

What's the present worth of 161*l.* 10*s.** for 19 Months, at 5*l.* *per Cent.*

```
   l.   s. d.  l.  s. d.   l.  s.      Mon. l. Months.
If 107  18 4—7  18 4—161  10      If 12—5—19
    20       20        20                   5
  ----     ----      ----                ----
  2158      158      3230                12|95
    12       12        12                ----
  ----     ----      ----                £. 7-11
 25900     1900     38760                    20
  ----     ----      1900                ----
                  ------ 12)             12|220
          25900)73644000(—2843                ----
                51800                  s. 18—4
                ------   2|0)23|6-11        12
                218440                     ----
                207200   £. 11-16-11 ¼ + 12|48
                ------                     ----
                 112400                    d. 4
                 103600
                 ------
                   88000
                   77700
                   ------
                   10300
                       4
                   ------
          25900)41200(¼
                25900
                ------
                15300
                ------
```

	l.	*s.*	*d.*
From given Sum *	161	10	0
Subtract Rebate †	11	16	11 ¼
Answer, present worth	149	13	0 ¾

What is the preſent worth of 4000*l.* payable in 9 Months, at 4 ¾*l. per Cent.*

Mon. l. *Mon.* *l.* *s.* *d.* *l.* *s.* *d.* *l.* *s.* *d.*

If 12—4¾—9 If 103 11 3—3 11 3—4000 0 0

4 20 20 20

96-0 2071 71 80000

2-5 12 12 12

4-10 24855 855 960000

12)42-15 855

£. 3-6 4800000

20 4800000

7680000

12)135 12)

24855)820800000(33023

s. 11-3 74565

12 2|0)275|1-11

12)36 75150

74565 £.*137-11-11½

d. 3 58500

49710

87900

74565

13335

4

l. *s.* *d.* 24855)53340(½

From given ſum 4000 0 0 49710

*Subtract Rebate** 137 11 11½

Preſent worth 3862 8 0½ 3630

Suppoſe

Suppoſe 810*l.* were to be paid three Months hence, allowing 5*l.* *per Cent* Diſcount, what muſt be paid in hand.

Mon.	*l.*	*Mon.*
If 12	5	3
		5
12)		15
		1-60
£.	1	5

l.	*s.*	*l.*	*s.*	*l.*	*l.*
If 101	5	1	5	810	0
20		20		20	
2025		25		16200	
				25	
				81000	
				32400	
					2|0)
				2025)405000	(20|0
				4050	
					10-0 £.
				00	

810
10

£. 800 Anſwer.

How much ready Money will pay of a Note of 18*l.* due 15 Months hence, at 5*l. per Cent.*

Mon.	*l.*	*Mon.*
If 12	5	15
		5
	12)75	
£.	6	3
		20
	12)60	
	s.	5

	l.	*s.*
	18	0
	1	1
	1	2
£.	16	18

	l.	*s.*		*l.*	*s.*		*l.*	*s.*
If 106	5		—6	5		—18	0	
	20			20			20	
	2125			125			360	
							125	
							1800	
							4320	
							2|0)	
						2125)45000(2|1		
							4250	
							1-1-2	
							2500	
							2125	
							375	
							12	
						2125)4500(2		
							4250	
							250	
							4	
							1000	

Answer, 16*l.* 18*s.* 10*d.*

What

What's the Discount of 6784*l.* for 2 three Months, that is, half at 3 Months, and the other half at 3 Months after that; If all the Money be paid in hand., what must be Discounted, after 6*l. per Cent. per Annum.*

Mon. l. Mon. *Mon. l. Mon.*

If 12—6—3 If 12—6—6

6 6

12)18 12)36

l. 1-10 *l.* 3

$\frac{1}{2}$)6784

3392

l. s. l. s. l. *l. l. l.*

If 101 10—1 10—3392 If 103—3—3392

20 20 20 3

2030 30 67840 Divisor 103)10176(98*l.*

30 927

2|0) 906

Divisor 2030)2035200(100|2 824

2030 50-2 82

5200 20

4060 103)1640(15

1140 103

12 610

2030)13680(6*d.* 515

12180 95

1500 12

4 103)1140(11

2030)6000($\frac{1}{2}$ 1133

4060 7

1940 4

l. s. d. 28

6784 0 0

For 3 Months, 50 2 6 $\frac{1}{2}$

For 6 Months, 98 15 11

All the discount, 148 18 5 $\frac{1}{2}$

To be Paid, 6635 1 6 $\frac{1}{2}$

Equation *of* Payments.

WHEN several sums of Money to be paid at different times, are reduced to one mean time for the Payment of the whole, without loss to Debtor or Creditor, this is called Equation of Payments.

R U L E.

Multiply each Payment by its time, and divide the sum of all the Products by the whole Debt, the Quotient is the Equated Time.

Admit *A*, is indebted to *B*, in the sum of 795*l.* 120*l.* part thereof, is to be paid at 2 Months, 235*l.* at 4 Months, 258*l.* at 7 Months, and 182*l.* at 9 Months, but they agree to make one entire payment of the whole Debt, I demand the Equated Time, without damage to Creditor or Debtor.

l.

120	Multiply'd	by 2 is	240
235	x,	by 4 is	940
258	x,	by 7 is	1806
182	x.	by 9 is	1638
795			4624

795)4624(5 Months.
3975
649
4
795)2596(3 Weeks.
2385
211
7
795)1477(1 Day.
95
Remains 682

Mon.	*Weeks.*	*Days.*
Anf. 5	3	1

Admit

Admit *A*, is indebted to *B*, in the sum of 864*l*. 130*l*. whereof is to be paid at 1 Month, 128*l*. at 3 Months, 240*l*. at 6 Months and the rest at 9 Months. I demand the Equated Time, of the Payment of the whole Debt. without damage to Debtor or Creditor.

l.				
130	Multiply'd	by 1 is	130	
128	x,	by 3 is	383	
240	x,	by 6 is	1450	
366	x,	by 9 is	3294	
864				*Mon. Days.*
			864)5248(—	6 — 2
			5184	
			64	
			4	
			256	
			7	
			864)1792(	2
			1728	
			64	

Answer, 6 Months, and 2 Days.

A Debt

A Debt of 600*l.* was to be paid thus, 200*l.* present, $\frac{1}{3}$ at 8 Months, $\frac{1}{5}$ at 10 Months, and the reſidue at the Years end; when may the money be paid altogether.

l.			
200			
200	x by	8	1600
120	x by	10	1200
80	x by	12	960
600			*M.* 3760

600)3760(6—8
3600

160
30

600)4800(8
4800

0

Anſ. 6 Months and 8 Days.

* An honeſt Man agrees to pay,
One hundred Pounds a certain way;
One fourth in hand, and as we find,
The ſame each three Months to his mind,
Until the whole's diſcharged fair,
What's the Equated time declare.

l.		*Mon.*		*l.*
25	x	3	=	75
		6		150
		9		225

100)450

4-5=4 $\frac{1}{2}$ Months.

* See *Sadler's Arithmetic.*

BARTER.

BARTER.

BARTER is the exchanging one Commodity for another, and informs Merchants ſo to proportion their Quantities, that neither may ſuſtain Loſs.

RULE.

The conciſeſt way to anſwer Queſtions in this Rule, is, firſt to find ont the value of the firſt Goods mentioned, by the ſhorteſt way of *Practice*, and then to anſwer it by the *Rule* of *Three*.

Or, find the value of that Commodity, whoſe quantity is given, then find what quantity of the other, at the given Rate you can have for the aforeſaid value, which quantity will be the Anſwer.

When one has Goods at a certain price, ready money, but in Barterage advances it ſomething more, ſay, as the ready money price of the one is to its Bartering Price, ſo is the ready money price of the other to its Bartering price, then the quantity of the latter Commodity, may be found either from the ready money, or the Bartering Price.

How

How much Sugar at 9*d.* *per* pound, muſt be given in Barter for 6*C.* 2*qrs.* of Tobacco, at 14*d.* *per* pound.

C.	*qr.*
6	2
4 *qrs.* 1 *C.*	
26	
28 *lb.* 1 *qr.*	
208	
52	
2*d.*—$\frac{1}{6}$)728	
121-4	
s. 849-4	

d.	*lb.*	*s.*	*d.*
If 9	1	849	4
		12	
		d.	
		9)10192	
		4)1132-4	
		7)283	
		4)40-12	
		Anſ. 10*C* 0*qr* 12*lb* $\frac{4}{7}$	

What quantity of Tea at 10*s.* *per lb.* muſt be given in Barter for 1 *C.* of Chocolate at 4*s.* *per lb.*

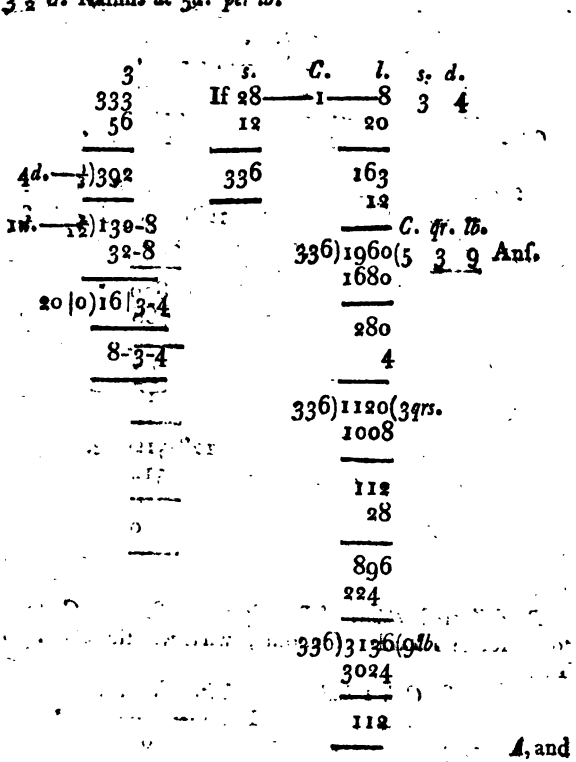
lb.
4*s.*—$\frac{1}{5}$)112
22-8

s.	*lb.*	*l.*	*s.*
If 10	1	22	8
		20	
		10)448	
		44-8	
		16	
		10)128	
		12-8 $\frac{8}{10}$	

Anſwer 44*lb.* 12*oz.* $\frac{8}{10}$

How

How much Rice at 28*s.* *per Cwt* muſt be Bartered for $3\frac{1}{2}$ *C.* Raiſins at 5*d.* *per lb.*



A, and

A, and *B*, Bartered, *A*, had 5 *Cwt.* of Sugar at 6*d. per lb.* which he gave to *B*, for a quantity of Cinnamon at 10*s.* 8*d. per lb.* I demand how much Cinnamon *B*, gave *A*,

C.	*s.*	*d.*	*lb.*	*l.*
5	If 10	8	—1—	14
555	12			20
6*d.*—½)560	128			280
2|0)28|0				12
14				*lb. oz.*
				128)3360(26 4 Anſ.
				256
				800
				768
				32
				16
				128)512(4*oz.*
				512
				0

B, delivered 3 *hhds.* of Brandy at 6*s.* 8*d. per.* Gallon, to *C*, for 126 Yards of Cloth; what was the Cloth *per* Yard.

63 *Gals* 1 *hhd.*	*Yds.*	*l.*	*Yd.*
3 *hhds.*	If 126—	63—	1
		20	
6*s.* 8*d.*—⅓)189			
63	126)1260(10*s.* Anſwer		
	1260		
	0		

A, and

A, and *B*, Bartered, *A*, had 12*hhds*. of Sugar, worth 4*d*. *per lb*. for which *B*, gave him 1 ¾*C*. of Cinnamon; I demand how *B*, rated his Cinnamon *per lb*.

```
                    C.        l.  s.   lb.
   C.          If 1 ¾———22  8———1
   12            111        20
   12             84       ———
   12            ———   196)448(2s 3d ¼. Answer.
   12            196       392
  ———                      ———
4d.-⅓)1344                  56
  ———                       12
  2|0)44|8                 ———
  ———                   196)672(3
   22-8                     588
  ———                      ———
                            84
                             4
                          ———
                        196)336(¼
                            196
                          ———
                            140
```

A, and *B*, Barter, *A*, hath 41*Cwt*. of Hops at 30*s per C*. for which *B*, giveth him 20*l*. in money, and the rest in Prunes at 5*d*. *per lb*. I demand how many *lb*. of Prunes *B*, gave *A*, besides the 20*l*.

```
        C.   l.  s.          d.   lb.   l.  s.
10s.—½)41  at 1   10     If 5——1——41   10
       20  10                        20
      ———                          ———
       61  10                       830
       20   0 Subtract.          d.  12
      ———                        ———
£.     41  10                    5)9960
                                 4)1992
                                 7)498
                                 4)71-4lb.
                                 ———
                                 17-3-4
```

Answer 17*C*. 3*qrs*. 4*lb*.

Question

Question by Mr. *Thomas Sadler.*

C, hath Corn at 5*s.* *per* Bushel not more,
But in Barter will have just $\frac{1}{3}$ of a Score;
D, a *Manchester* Tradesman, hath Fustians we find,
Worth i ready Money; the sum here subjoin'd, *
Then how much *per* Yard must the Fustian by *D*,
Be rated equivalent with *C's*, to agree.

* 2*s.* 9*d.* $\frac{1}{2}$. *per Yard*

s.	s.	d.	s.	d.
If 5	6	8	2	9 $\frac{1}{2}$
12	12		12	
60	80		33	
4	4		4	
240	320		134	
			320	
			2680	
			402	

24|0)4288|0(—178
24
188
168
208
192
16

12)44—$\frac{1}{2}$
3-8-$\frac{1}{2}$

Answer 3*s.* 8*d.* $\frac{1}{2}$.

LOSS

LOSS and GAIN.

THIS RULE teacheth Merchants what they gain or lose, in the sale of their Goods, having the Price that they bought them for, and the price for which they are to be sold for, both known.

RULE.

When there is Gain *per Cent*, add the gain *per Cent* to 100*l* but wher ethere is Loss *per Cent*, Subtract as much as you lose *per Cent*, from 100*l*. the sum or difference is the third number in the *Rule* of *Three*.

Admit a Man buys 128 Yards of Cloth, at 7*s*. 9*d*. ½. *per* Yard, and sells it at 9*s*. 3*d*. ½. *per* Yard; how much gains he in the sale of the whole.

	s.	*d.*		
Subtract	9	3 ½	selling Price	*per* Yard.
	7	9 ½	buying Price	

Yd.		*Yds.*
If 1	6	128
12		18
18		12)2304
		2|0)19|2
		£. 9-12

A Draper

A Draper bought 124 Yards of Holland Cloth, for which he gave 31*l.* I desire to know how he must sell it *per* Yard, to gain 10*l.* 6*s.* 8*d.* in the sale of the whole 124 Yards.

	l.	*s.*		
add	31	0		
	10	6	8	
Yds.				*Yd.*
If 124	41	6	8	1

20

826

12

124)9920(80 = 6*s* 8*d.* Anſ.

992

0

Admit a Merchant do buy Goods to the value of 425*l.* and offers them again for 15*l. per Cent* Profit, what came they to.

	l.		*l.*
	100	add	
	15		
l.			*l.*
If 100	115		425

115

1|00)488|75

20

1|00)15|00

Anſwer 488*l.* 15*s.*

In this Example the profit being 15*l. per Cent*, is added to 100*l.* for the ſecond Term as *per Rule.*

Bought

Bought 18*C.* of Cheese at 28*s.* *per C.* which I sell out again at 3*d.* ½ *per lb.* what is the profit in the whole.

C.		*lb.*	*d.*	*lb.*
18	If	1	3 ½	18
28*s.* *per C.*		4		18
144		14		18
36				2016
2|0)50|4				14
£. * 25-4 Cost.				4)28224
				12)7056
				2|0)58|8
				29-8 Sold for.
				* 25-4 Cost.
				£. 4-4 Anſ. the Profit.

In this Example, firſt find what the Cheese comes to, at the buying Rate, and likewiſe what it comes to at the Rate he ſells it out again, the difference between thoſe two ſums, (*viz.* what it coſt, and what ſold for,) is the Profit in the whole.

Bought,

Bought 60 Reams of Paper at 15*s.* *per* Ream, what is the loſs in the whole quantity at 4*l.* *per Cent.*

l.	*l.*	*l.*
If 100	96	45
	45	
	480	
	384	
	43|20	
	20	
	4|00	

l.	*s.*		
45	0	Subtract.	100
43	4		4
Anſ. 1	16		96

60
15
2|0)90|0
£. 45-0

Or thus.

l.	*l.*
If 100	4 — 45

l.
1|00)1|80
20
s.
16|00

Anſwer, 1*l.* 16*s.* 0*d.* as before.

In this Example, (the ſecond way of working it,) firſt find what the Paper coſt, then ſay, as 100*l.* is to 4*l.* the loſs *per Cent*, ſo is 45*l.* to the loſs of the whole quantity.

If

If I buy Deals in at 20*d.* a piece, and fell them again at 17*d.* what ſhall I loſe by 120 Dozen.

d.
20 } Subtract
17 }

Deal. — *Doz.*
If 1——3——120
12 *per Dozen.*
1440
3 *middle Number.*
12)4320
2|0)36|0
£. 18-0

In this Example, firſt find the Difference between the buying and felling price, which is 3*d.* loſs, then ſay, if 1 Deal 3*d.* what 120 Dozen, and work as before. Anſwer, 18*l.*

Hats bought at 4*s.* a piece, and ſold again at 4*s* 9*d.* what is the Profit in laying out 100*l.*

s. *d.* *l.*
If 4—9—100
20
2000
9 *middle Number.*

s. *d.*
4 9 } Subtract.
4 0 }
9

1*ſt No* 4)18000
12)4500
2|0)37|5
£. 18-15

In this Example, find the difference between the buying and ſelling Price, (as in the laſt Example,) which is 9*d.* gain, then as 4*s.* is to 9*d.* gain, ſo is 100*l.* to the profit in laying out 100*l.* Anſwer.

If I ſell 500 Deals at 15*d.* a piece, and 9*l.* *per Cent* loſs. whtt do I loſe in the whole quantity.

Deal.	*d.*	*Deals.*
If 1	15	500
		15
		12)7500
		2|0)625
		l. 31-5

l.	*l.*	*l.*	*s.*
If 100	9	31	5
20	20	20	
2000	180	625	
		180	
		2|0)	
		2000)112500(	5|6
		10000	
		l. 2-16-3	
		12500	
		12000	
		500	
		12	
		2000)6000(3*d.*	
		6000	
		0	

Note, This Example I had from Mr, *Dilworth's Arithmetic*, and the anſwer agrees with his, but Mr. *Sadler* obſerves it is ſolved wrong, and that the error conſiſts in the ſtating of the Queſtion, by making the gain or loſs of 100*l.* the ſecond Term, inſtead of its amount, ſee the next Operation.

$\frac{1}{4}$—500

l.
From 100
Take 9

If 91 —— 100 —— 31 5
20 20 20

1820 2000 625

$\frac{1}{4}$—500 at 15 *per.*
125

2|0)62|5

£. 31-5

2000

2|0)

1820)1250000(—68|6

10920

15800
14560

12400
10920

1480
12

1820)17760(9*d.*
16380

1380
4

1820)5520($\frac{3}{4}$
5460

60

34-6-9 $\frac{3}{4}$
31-5 Deduct.

3-1-9 $\frac{3}{4}$ Anſwer.

So the Anſwer according to *Sadler* is 3*l.* 1*s.* 9*d.* $\frac{3}{4}$. which in *Dilworth* is only 2*l.* 16*s.* 3*d.*

	Money received.	*Loss per Cent.*	*Money received.*			
	l.	*l.*	*l*	*s.*	*d.*	*l.* *s.* *d.* *l.*
Or, as	91	9	31	5	0	3 1 9 ¾ loss at 9 *per C.*

See the Work.

l. *l.* *l.* *s.* *d.*

If 91 — 9 — 31 5 0

20 20 20

1820 180 625

180

2 | 0)

1820)112500(6 | 1

10920

3-1-9 ¼ Answer, the same as in the last Operation.

3300

1820

1480

12

1820)17760(9*d.*

16380

1380

4

1820)5520(¾

5460

60

l. *s.* *d.*

31 5 0

3 1 9 ¾

Therefore the Deals cost when bought in. } 34 6 9 ¾

Proved by the following Proportion.

	l.	*l.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
As	100	9	34	6	9 ¾	3	1	9 ¾

Question

Question by Mr. Dilworth.

Bought 7 Tuns of Winc at 17*l.* *per* Hogshead, which I sell again at 1 Shilling *per* Pint, I demand the whole gain; and also the gain *per Cent.*

hhd. l. Tun.
If 1—17—7
4
28
17
£. * 476 cost him.

Pt. s. hhds.
If 1—1—28
63
84
168
1764
4
7056
2
2|0 1411|2
705-12 *Sold for.*
* 476-0 *cost him.*
Ans. 229-12 *whole gain.*

To find the gain *per Cent*, say

l. l. s. l.
*If 476——229 12—100
20 20 20
9520 4592 2000
4592
4000
18000
10000
8000
2|0)
9520)9184000(96|4
85680
£ 48-4-8¼
61600
57120
44800
38080
6720
12
9520)80640(8*d.*
76160
4480
4
9520)17920(¼
9520
8400

A

A Draper bought 100 Yards of Broad Cloth, for which he gave 56*l.* I desire to know how he must sell it *per* Yard, to gain 19*l.* in the whole.

l.		*Yds.*	*l.*	*Yd.*
56 }	add	If 100	75	1
19 }			20	
75		2|00	15|00	
			15	

Answer 15 Shillings *per* Yard.

Bought 3 Oxen for 24*l.* 10*s.* which I sell again for 2*s.* *per* Stone, what ought the 3 Oxen to weigh together, the Hides and offal being the only gain.

s.	*Stone.*	*s.*	*s.*		
If 2	1	24	10	245	
		20		2	
		2)490		2|0)49|0	
				24-10	Proof.
					Admit

Answer, 245 *Stone.*

Admit a man at one time buys 120 Eggs at 2 for a penny, at another time 110 more for 3 a penny, and ſells them again at 5 for two-pence, doth he gain or loſe, and how much, by the bargain.

Eggs.	*d.*	*Eggs.*
If 2	1	120
		1
		2)120
		12)60
		5*s.*

Eggs.	*d.*	*Eggs.*
If 3	1	120
		1
		3)120
		12)40
		3—4

Eggs.	*d.*	*Eggs.*
If 5	2	240
		2
		5)480
		12(96
		8*s.*

	5—0
	8—4
	8—0
	4

Anſwer, 4*d.* he loſt and labour.

TARE and TRET.

GROSS Weight is the weight of any Commodity with the weight of the Hogſhead, Cheſt, Caſk, Box, Wrapper, or any thing elſe that contains the Goods, or any quantity given in Hundreds, Quarters, and Pounds is Groſs Weight.

TARE is an allowance made by the ſeller to the buyer, for the weight of the Hogſhead, Caſk, Cheſt, Box, Bag, *&c.* wherein the Goods are contained, and is ſometimes reckoned at ſo much *per* Bale, Bag, Barrel,

Cheſt, *&c.* as in Silks, Cottons, Raiſins, Capers, at other times at ſo much *per Cent*, as 10, 14, 16, or 24*lb*, *per C.* There is alſo a diſtinction of *Cuſtom-Houſe*, and *Invoice* TARE, as in Tobacco's and Indigo's, *&c.* and ſometimes uncertains, as in Tobacco's and Sugars, happening according to the Size of the Caſk.

TRET is an allowance of 4*lb.* upon every 104*lb.* Suttle, claimed by the Freemen of the City of LONDON, and ſometimes to others alſo, and this is allowed for waſte and duſt, on ſome ſorts of Goods, as on Tobacco's, Spices, Drugs, *&c.*

CLOUGH Is an allowance of 2*lb.* upon every draught above 3*Cwt.* to Citizens of LONDON.

NEAT WEIGHT, is what remains when the allowances are deducted.

SUTTLE is the weight of the Goods when the TARE is ſubtracted, but not the TRET.

The *Table* of Allowances for *Tare.*

For *Cyprus* and *Smyrna* Silk.

			lb.
Bales	about or above 300*lb.*	The Tare *per* Bale.	16
	form 300*lb.* to 200*lb.*		14
	from 200*lb.* downwards.		12

For *Virginia* Tobacco.

			lb.
Hhds.	5*C.* and upwards.	The Tare *per* Hogſhead is,	100
	from 5 to 4*C.*		90
	from 4 to 3*C.*		80
	under 3*C.*		70

For *Sugar* from *India.*

In Caſks and Caniſters, } Tare, { $\frac{1}{6}$
In Cheſts and Caſks from *St. Thome.* } { $\frac{1}{5}$

Oil from *Candia*, Tare 29*lb. per* Barrel.

Note. 7½*lb.* of Oil make a Gallon, therefore to reduce pounds into Gallons, multiply by 2 and divide by 15.

RULE

RULE. I.

When the Tare is at ſo much *per* Barrel, Bag, *&c.* Multiply the number of the ſaid Barrels, Bags, *&c.* by the Tare, and ſubtract that Product from the Groſs, the remainder is the Neat.

In 16*hhds.* of Tobacco each 5*C.* 1*qr.* 19*lb.* Groſs, Tare *per hhd.* 100*lb.* how much neat weight.

lb.
100
16 Hogſheads.
1600

C.
5
555
47 *odd weight.*
607
16
9712
Subtract 1600 Tare.
4)
28)8112(289
56
C. 72-1-20
251
224
272
252
Remains 20*lb.*
Anſ. 72*C.* 1*qr.* 20*lb.*

In 14*hhds.* of Tobacco weighing 89*C.* 3*qr.* 17*lb.* Tare *per hhd.* 100*lb.* how much neat weight.

lb.
100
14 Hogſheads.
1400 Tare in the whole.

C. *qr.* *lb.*
89 3 17
4
359
28
2879
719
10069
Subtract 1400 *whole Tare.*
4)
28)8669(309
84
C. 77-1-17
269
252
Remains 17*lb.*

In 70 Bales of *Smyrna* Silk, each 317*lb.* Groſs, Tare *per* Bale 16*lb.* how many Pounds neat,

	lb.		
	317		70 Bales.
	70 Bales,		16 Tare *per* Bale.
Subtract	22190		1120 the whole Tare.
	1120 whole Tare.		
	21070	Anſwer,	21070*lb.*

What's the neat weight of 30 Bales of *Cyprus* Silk, each weighing 249*lb.* Groſs, Tare *per* Bale 14*lb.*

lb.		
249		
30 Bales.		30 Bales.
		14 Pounds *per* Bale.
7470		
420 Tare ſubtract.		420 Pounds,

Anſ. 7050 neat weight

RULE II.

When the Tare is an Aliquot part or parts of the *Cwt.* divide the whole Groſs by the part or parts that the Tare is of an *Cwt.* and the Quotient gives the Tare of the whole, which ſubtract from the whole Groſs, the remainder is the neat weight.

Note. I. Figs, Almonds, Argol, *&c.* 14*lb. per Cent*, Caroteels, Buts of Currants, *&c.* 16*lb. per Cent*, Oil in uncertain Caſks, *&c.* 18*lb. per Cent.*

II. Whatever part the given Tare is of an *Cwt.* the ſame muſt the whole Tare be of the given Groſs weight.

What

What is the neat weight of 12 Barrels of Argol, Groſs 48*C.* 3*qr.* 12*lb.* Tare 14*lb. per Cent.*

lb.	*C.*	*qr.*	*lb.*
14=$\frac{1}{8}$)48	3	12
6	0	12
42	3	0

Anſwer, 42*C.* 3*qr.* 0*lb.*

In 12 Butts of Currants each 7*C.* 1*qr.* 10*lb.* Groſs, Tare *per Cent* 16*lb.* how much neat weight.

	C.	*qr.*	*lb.*	
	7	1	10	
			12	Butts,
lb.				
16=$\frac{1}{7}$)88	0	8	*oz.*
12	2	9	2
C. 75	1	26	14

Anſwer, 75*C.* 1*qr.* 26*lb.* 14*oz.*

Note. When the Tare is not the Aliquot part or parts of *Cwt.* then multiply the pounds Groſs, by the Tare *per Cent* given, and that Product divided by 112, the Quotient is the whole Tare, which ſubtract from the Groſs, the remainder is neat.

What is the neat produce of 20 Barrels of Anchovies, each Groſs 33*lb*. Tare *per Cent*, 10*lb*.

	lb.	
each	33	Groſs.
	20	Barrels.
	660	
	10	Tare *per Cent*.
112)6600(58*lb*.		
	560	
	1000	
	896	
	104	
	16	*oz. make 1lb*.
112)1664(14*oz*.		
	112	
	544	
	448	
	96	

	lb.	*oz*.
Subtract	660	0
	58	14
Anſ. *lb*.	601	2

RULE III.

When the Tare is at ſo much in the whole Groſs weight, ſubtract the Tare from the Groſs, and the remainder is neat.

What's

What's the neat weight of 38*hhds*. of Tobacco, weighing Groſs 201*C*. 3*qr*. 12*lb*. Tare in the whole 3140*lb*.

```
          C.  qr.  lb.
         201   3   12
         201
        201
       20184 }
          12 }  odd weight.
       ------
Subtract { 22608 whole Groſs weight.
         { 3140 whole Tare.
       ------ 4)
   28)19468(—695
      168      ------
      ---  C. 173-3-8.
       266
       252
       ---
        148
        140
        ---
Remains  8lb.
```

Anſwer, 173*C*. 3*qr*. 8*lb*.

What's

What's the neat weight of 3 Hogſheads of Tobacco, weighing as follows, *viz.*

	C.	*qr.*	*lb.*		*lb.*
No. 1—3	1	2			80
2—3	2	1		Tare	80
3—5	1	12			100
	12	0	15		260 whole Tare.

12
12
1215 odd weight.

1359
Tare ſubtract 260

4)
28)1099(39
84

9 3 7
259
252

Remains 7 *lb.*

Anſwer, 9*C.* 3*qr.* 7*lb.*

RULE IV.

When Tret is allowed with Tare, divide the Pounds Suttle by 26, the Quotient is the Tret, which ſubtract from the Suttle, the remainder is the neat weight.

In

In 8*C*. 3*qr*. 20*lb*. Grofs, Tare 38*lb*, Trett 4*lb*. *per* 104*lb*. how many Pounds neat.

C.	*qr*.	*lb*.
8	3	20
888		
104	odd weight.	
1000		
38	Tare.	

26)962(37
78
182
182
0

lb.	
962	Suttle.
37	Tret.
Anf. 925	neat weight.

ALLIGATION Medial,

WHEN you are to refolve a queftion in *Allegation Medial*, which teaches how to find the mean rate of a Mixture, when each particular quantity and there feveral rates are given, obferve the following,

RULE.

Take care at firft to Multiply the quantities of the Mixture by their refpective prices, and divide the fum of the Products by the fum of the quantities, the Quotient will be the mean rate.

Or

Or, as the whole compoſition is to the total value, ſo is any part of the compoſition to the mean Price.

A Farmer mingled 19 Buſhels of Wheat at 6*s.* *per* Buſhel, and 40 Buſhels of Rye at 4*s.* *per* Buſhel, and 12 Buſhels of Barley at 3*s.* *per* Buſhel together; I demand what a Buſhel of this Mixture is worth.

						l.	*s.*	*d.*
Wheat	19	Buſhels	at	6*s.*	*per* Buſhel, is	5	14	0
Rye	40	Dit.	at	4*s.*	*per* Buſhel, is	8	0	0
Barley	12	Dit.	at	3*s.*	*per* Buſhel. is	1	16	0

	l.	*s.*	*d.*	*Buſhel.*			
If 71	15	10	0	1	15	10	0
	20						

71)310(4*s.* 4*d.* $\frac{1}{4}$.
284

26
12

71)312()4*d.*
284

28
4

17)112($\frac{1}{4}$
71

41 Anſwer, 4*s.* 4*d.* $\frac{1}{4}$.

A Vintner

A Vintner mixed 5 Gallons of Canary at 8*s.* *per* Gallon, and 6 Gallons of Malaga at 7*s.* Gallon, and 4 Gallons of White Wine at 6*s.* *per* Gallon, together, I demand what a Gallon of this mixture is worth.

				l.	*s.*	*d.*
Canary,	5 Gallons,	at 8*s.* *per* Gallon is		2	0	0
Malaga,	6 Dit.	at 7*s.* *per* Gallon is		2	2	0
White Wine,	4 Gallons,	at 6*s.* *per* Gallon is		1	4	0
	15		£.	5	6	0

Gals. *l.* *s.* *d.* *Gal.*

If 15——5 6 0——1

20

15)106(7*s.* 0*d.* $\frac{3}{4}$.

105

1

12

12

4

15)48($\frac{3}{4}$

45

3

Anſwer, 7*s.* 0*d.* $\frac{3}{4}$.

A Grocer

A Grocer mingled 2*C*. of Sugar at 56*s*. *per* Hundred, and 1*C*. at 43*s*. *per C*. and 2*C*. at 50*s*. *per C*. together, I demand the Price of 3 hundred of this Mixture.

C.	*s*.		*l*.	*s*.	*d*.
2 at	56	*per C*. is	5	12	0
1 at	43	*per C*. is	2	3	0
2 at	50	*per C*. is	5	0	0

	l.	*s*.	*C*.			
If 5	12	15	3	12	15	0

20

255

12

3060

3

5)9180

12)1836

2|0)15|3

£. 7-13 Anſwer.

A Refiner hath 3 Pounds weight of Gold, of 22 Carats fine, and 3 Pounds weight 20 Carats fine, I demand what fineneſs an Ounce of this Mixture will bear.

lb.		
3	of 22 Carats fine is	66
3	of 20 Carats fine is	60
6		6)126
		21

Anſwer, 21 Carats fine.

A Ale

An Ale Houſe keeper mixed 3 ſorts of Ale together, *(viz.)* 12 Gallons at 6*d*. *per* Gallon, 16 Gallons at 7*d*. *per* Gallon, and 21 Gallons at 9*d*, *per* Gallon, I demand what 1 Gallon of this Mixture is worth.

			s.	d.
12	Gallons	at 6*d*. is	6	0
16	Dit.	at 7*d*. is	9	4
21	Dit.	at 9*d*. is	15	9
49		£.	1 11	1

Gals.	*l*.	*s*.	*d*.	*Gal*.
If 49	1	11	1	1

20

31
12

49)373(7*d*. $\frac{5}{49}$. Anſwer.
343

30
4

49)120($\frac{2}{49}$
98

22

A Malſter

A Malſter hath ſeveral ſorts of Malt, *viz*) one ſort at 4*s*. 6*d*. another at 4*s*. and a third at 3*s*. 6*d*. *per* Buſhel, and he would mix an equal quantity of each together, I demand the price of a Buſhel of this Mixture.

	s.	*d.*		*s.*	*d.*
1 at	4	6	is	4	6
1 at	4	0	is	4	0
1 at	3	6	is	3	6
3				3)12	0
				4	0

This might be called 2 of each ſort, or any other number, ſo they be of equal quantity.

Anſwer, 4*s*. 0*d*.

An Hoſtler mixing Provender for his Horſes, would put in a Quantity of Beans at 5*s*. *per* Buſhel, with a like quantity of Oates at 3*s*, 6*d*. *per* Buſhel, I demand the price of a Buſhel of this Mixture.

	Buſhels.			*l.*	*s.*	*d.*
Suppoſe	4	at 5*s*. *per* Buſhel,	is	1	0	0
and	4	at 3*s*. 6*d*. *per* Buſhel,	is	0	14	0
	8		£.	1	14	0

Buſh.	*l.*	*s.*	*d.*	*Buſh.*
If 8	1	14	0	1

20

8)34

s. 4—2

12

8)24

d. 3

Anſwer, 4*s*. 3*d*.

Alligation

ALLIGATION Alternate.

IS when the rates of ſeveral commodities are given, to find ſuch Quantities of them, as being mixed together ſhall bear a Price propounded.

RULE.

I. The Rates (if not already) muſt all be reduced to one denomination.

II. Set down the rates or prices, in a column under one another, and the mixed or mean rate on the left hand of theſe.

III. Connect or link together the ſeveral rates ſo that every one leſs than the mean, be linked with ſome one greater, or with as many as you pleaſe, that are greater, and every great with one leſs, or with as many leſs as you pleaſe.

IV. Take the difference between each price and the mean rate, and ſet them down alternately, and if only one difference ſtand againſt any rate, it will be the quantity belonging to that ſaid rate; but if there are ſeveral, then their ſum will be the quantity, which quantities are the Anſwer for that rate, againſt which they ſtand.

A Grocer

A Grocer would mix Raisins of the Sun at 8*d.* *per lb.* with Malaga's at 5*d.* *per lb.* and Smyrna's at 4*d.* *per lb.* I desire to know what quantity of each sort he must take so that the mixture may be worth 6*d.* *per lb.*

	d.		*lb.*		*d.*		*d.*
6	8	1 + 2 =	3	of	8	Ans.	24
	5	———	2	of	5		10
	4	———	2	of	4		8
			7				7)42
						Proof	6

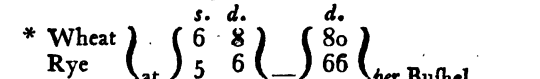
A Grocer would mix Sugar at 11*d.* 6*d.* and 5*d.* *per lb.* so that the composition may be worth 7*d.* *per* Pound, what quantity of each must he take.

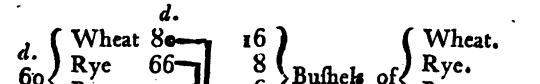
	d.		*lb.*		*d.*	
7*d.*	11	2 + 1 =	3	at	11	*per lb.*
	6	———	4	at	6	*per lb.*
	5	———	4	at	5	*per lb.*

d.
33
24
20
11)77
7 Proof.

* Old

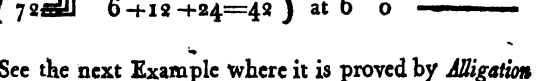
† Old *Merry* the Miller, would mix as we find,
What Corn you obſerve below here * ſubjoin'd;
How much of each ſort will exactly agree,
To be ſold at four Shillings *per* Buſhel tell me.





† SADLER.

A Meal-man hath four ſorts of Meal, *(viz.)* one ſort at 3*s.* another at 4*s.* a third at 4*s.* 6*d.* and a fourth at 6*s.* *per* Buſhel, but he is deſirous of mixing ſo much of each ſort together, that he may ſell it at 5*s.* *per* Buſhel, how much of each ſort muſt he take.



* See the next Example where it is proved by *Alligation Medial.*

		s.	d.		l.	s.	d.
* 12	Buſhels at	3	0	*per* Buſhel, is	1	16	0
12	Dit.	4	0	*per* Buſhel, is	2	8	0
12	Dit.	4	6	*per* Buſhel, it	2	14	0
42	Dit.	6	0	*per* Buſhel, is	12	12	0
78					19	10	0

20

390

12

78)4680(60

468

0

Anſwer 60*d.* or 5*s.* agreeable to the laſt Queſtion.

A Malſter hath ſeveral ſorts of Malt, *(viz.)* one ſort at 4*s.* *per* Buſhel, another at 3*s.* 6*d.* a third at 3*s.* and a fourth at 2*s.* *per* Buſhel; and he is deſirous to mix ſo much of each ſort together, ſo that the whole may be ſold at 2*s.* 6*d.* *per* Buſhel, I demand how much he muſt take of each ſort.

d.				*s.*	*d.*
d. 30	48	6	at	4	0
	42	6	at	3	6
	36	6	at	3	0
	24	6+12+18=36	at	2	0

		s.	*d.*	
Anſ.	6 at	4	0	*per* Buſhel.
	6 at	3	6	
	6 at	3	0	
	36 at	2	0	

A Grocer would mix three ſorts of Sugar together, *(viz.)* one ſort at 10*d.* *per lb.* another at 7*d.* and another at 6*d.* how much of each ſort muſt he take, to make up a Compoſition of 8*d.* *per lb.*

d.		*lb.*	*d.*		*lb.*	*d.*	
d. 8	10	2+1=3	at 10	Anſ.	3	at 10	*per lb.*
	7	2	at 7		2	at 7	*per lb.*
	6	2	at 6		2	at 6	*per lb.*

Exchange

EXCHANGE.

I. EXCHANGE is the giving of the money, weights, or measure, of one Country, for the like value in Bills, Money, Weight, or Measure, of another Country.

II. The course of Exchange, is the value of Money agreed on among Merchants.

III. The course of Exchange rises or falls almost every day, according as Money is plenty or scarce, or according to the time allowed for Payment of the Money, in Exchange, and then the value is said to be above or under Par.

IV. The Par of Exchange, is the intrinsic value of any Foreign Money, compared with Sterling Money.

CASE I.

LONDON Exchange with (in Dollars or Pieces of Eight of *Mexico*) MADRID and CADIZ in SPAIN, and with GENOA and LEGHORN in ITALY.

They keep their Accompts in SPAIN in *Rials* and *Marvedies*.

Note. 372 *Marvides* make 1 *Rial*, 8 *Rials* 1 *Piece of Eight*.

They keep their Accompts in ITALY in *Livres*, *Sols*, and *Deniers*.

Note. 12 Deniers, 20 Sols, 5 Livres, 6 Livres } make { 1 Sol, 1 Livre, 1 Piece of Eight at GENOA, 1 Piece of Eight at LEGHORN.

What's the Amount of 63*l.* Sterling in Pieces of Eight, at 56*d.* *per* Piece.

l.
63
20
1260
12
d.
56)15120(270 Anſ.
112
392
392
0

A Factor hath ſold Goods at *Cadiz*, for 1468 Pieces of Eight, at 4*s.* 6*d.* ½. *per* Piece, how much Sterling is the Sum.

s.	*d.*	
4	6 ½	1468 *Ps of* 8.
12		218 *per Piece*
54		11744
4		1468
218 *per P.*		2936
		4)320024
		12)80006
		2|0)666|7-2
		£. 333-7-2 Anſ.

CASE II.

London Exchange with (in Ducats) Venice in Italy.

Note. Six Solidi make 1 Groſs, 14 Groſſes 1 Ducat.

There are 2000 Ducats, at 4*s.* 4*d.* each, remitted to London, to be paid in Pounds Sterling, what is the Amount.

s.	*d.*
4	4
21	
52 each.	

2000 Ducats
52
4000
10000
12)104000
2\|0)866\|6-8
Anſ. 433-6-8

A Bill

A Bill of 100*l.* Sterling is remitted to *Venice*, to be paid in Ducats at 4*s* 4*d* each, what is the Amount.

s.	*d.*	*l.*
4	4	100
12		20
52		2000
		12

52)24000(461
208
320
312
80
52
28

Anſ. 461 $\frac{28}{52}$ Ducats.

A Traveller would exchange 233*l* 16*s* 8*d* Sterling, for *Venice* Ducats at 4*s* 9*d per Ducat*, how many muſt he have.

s.	*d.*	*l.*	*s.*	*d.*
4	9	233	16	8
12		20		
57		4676		
		12		

57)56120(984
513
482
456
260
228
32

Anſ. 984 $\frac{32}{57}$ Ducats.

CASE III.

London Exchanges with (for *French* Crowns) Paris, Lyons, Rouen, *&c.* in France.

They keep their Accompts in France, in Livres, Sols, and Deniers.

Note, 12 Deniers } make { 1 Sol.
20 Sols } make { 1 Livre.
3 Livres } make { 1 Crown.

A Bill of 200*l.* is remitted to *Paris* by a Merchant in *London*, what is the value in *French* Crowns at 4*s* 6*d* each.

s.	*d.*	*l.*
4	6	200
12		20
		4000
54		12

54)48000(888 $\frac{48}{54}$ Anſ.
432
480
432
480
432
48

There are 800 *F. Crowns* remitted to *London* by a Merchant in *Paris*; what is the value in Pounds Sterling.

s.	*d.*	800 *F. Crowns*
4	6	54
12		
		3200
54		4000

12)43200
2|0)3601 0

£. 180

Anſwer, 180*l.* Sterling.

CASE IV.

LONDON Exchanges with (for Mill-Reas) OPORTO, LISBON, *&c.* in PORTUGAL, and with the Iſland of MADEIRA. They keep their Accompts in PORTUGAL in Reas.

Note. 1000 Reas make 1 Mill-Rea.

If a Bill is drawn from *Liſbon* of 1432 Mill-Reas at 6*s* 8*d per* piece, how much *Engliſh* money is that Bill.

s.	*d.*	1432 *Mill-Reas.*
6	8	80
12		
		12)114560
80		

2|0)954|6-8

£. 477-6-8 Anſ.

If a Bill be drawn from *London* of 1333*l* 6*s* 8*d* Sterling, how much is it at *Liſbon* in Mill-Reas at 6*s* 8*d*.

		l.	*s.*	*d.*
		1333	6	8
		20		
		26666		
s.	*d.*	12		
d.=6	8			
80		)320000(4000 Anſ.		
		320		
		000		

Caſe

CASE V.

LONDON exchanges with (in Ducatoons) FLORENCE in ITALY.

A Bill of 120 Ducatoons is remitted from *Florence* at 53*d* each; what is the value in Pounds Sterling.

120 Ducatoons.
53 Pence.

360
600

12)6360

2|0)53|0

£. 26-10 Anſwer.

A Bill of 220*l* 16*s* 8*d*. is drawn from *London*; what is the value at *Florence* in Ducatoons at 53*d*. each.

l.	*s*.	*d*.
220	16	8
20		
4416		
12		

d.

53)53000(1000 Anſwer.
53

000

CASE VI.

LONDON exchanges with (for Florins) FRANKFORD, in GERMANY.

If 247*l* 18*s* 4*d* Sterling be remitted to *Frankford*, what is the value in Florins, at 59*d* ½. each.

If 100 Florins at 59*d* ½. each be remitted from *Frankford* to *London*; what is the value in Pounds Sterling.

d.	*l.*	*s.*	*d.*
59 ½	247	18	4
4	20		
238	4958		
	12		
	59500		
	4		
Farthings			

238)238000(1000 Anf.
238
000

100 *Florins.*	*d.*
238 *Farthings.*	59 ½
	4
800	
300	238
200	*Farthings.*
4)23890	
12)5950	
2 10)49 5-10	

£. 24-15-10 Anfwer.

CASE VII.

LONDON exchanges with (by the Pound *Flemiſh*, or Pound Sterling) ANTWERP, BRUSSELS, AMSTERDAM, ROTTERDAM, and all parts of the *Spaniſh* and *United Provinces*, alſo with HAMBURG in *Germany*.

They keep their Accompts in theſe places, ſome in Pounds, Shillings, and Pence, as in *England*, and others in Guilders, Stivers, and Pennicks.

Note, 16 Pennicks, 20 Stivers, 6 Stivers, 6 Guilders } make { 1 Stiver. 1 Guilder. 1 Shilling. 1 Pound *Flemiſh*.

Being

Being desirous to remit to my Correspondent at London, the Sum of 2000*l.* 12*s.* 6*d.* *Flemish*, to dispose of according to my order: Exchange at 34*s.* 6*d.* *Flemish per* Pound Sterling; how much Money Sterling, shall I be Creditor for, in the City of London aforesaid.

s.	*d.*	*l.*	*l.*	*s.*	*d.*
If 34	6	1	2000	12	6
12			20		
			40012		
414			12		
				l.	*s.* *d.*

414)480150(1159 15 7 $\frac{3}{4}$ $\frac{126}{414}$ Anf.
414
661
414
2475
20
4950
3726
324
20
414)6480(15*s.*
414
2340
2070
270
12
414)3240(7*d.*
2898
342
4
414)1368($\frac{3}{4}$
1242
126

My

My Correſpondent in *England* gives me notice that he has diſburſed in Merchandize upon my account, the Sum of 1000*l.* Sterling, what Sum muſt I anſwer for that in *Holland*, the courſe of Exchange being at 33*s* 4*d.* *Flemiſh* for one Pound Sterling.

l.	*s.*	*d.*			
If 1	— 33	4	— 1000		
	12		400		
400	12)400000				
	2 | 0)3333 | 3-4				
Anſ. *	1666-13-4				

Note. When the Courſe of Exchange is at 33*s* 4*d* *Flemiſh* Money into *Engliſh* Money. Multiply the *Flemiſh* Money by 3, and divide that Product by 5, the Quotient will give Pounds Sterling, and the Contrary.

See the next Example.

* In 1666*l* 13*s* 4*d.* *Flemiſh* Money, how many Pounds *Engliſh*.

l.	*s.*	*d.*	
1666	13	4	
		3	
5)5000	0	0	
Anſ. 1000	0	0	

See the laſt Sum.

Again, In 1000*l* *Engliſh* Money, how many Pounds *Flemiſh*.

l.			
1000			
5			
3)5000			
	s.	*d.*	
1666	13	4	Proof of the other Example.

See the Firſt Example in this Page.

My

My Correſpondent in ROTTERDAM ſends me word, that he has diſburſed upon my Account, the Sum of 3060 Guilders and 15 Stivers; what Sum muſt I anſwer for that at LONDON, the courſe of Exchange being at 37*s* 9*d*. *Flemiſh per* Pound Sterling.

Note, A Stiver is 2*d*. *Flemiſh*, and a Guilder 40*d*.

Guilders.	*Stivers.*
3060	15
40	2
122400	30
30	
12)122430	
2|0)1020|2-6	

£. 510-2-6 *Flemiſh*.

See the right hand Example for Anſwer.

s.	*d.*	*l.*	*l.*	*s.*	*d.*
If 37	9	— 1 —	510	2	6
12			20		
453			10202		
			12		
				l.	*s. d*

453)122430(270 5 3½

906

3183

3171

120

90

453)2400(5*s*.

2265

135

12

453)1620(3*d*.

1359

261

4

453)1044(½

906

138

Anſwer, 270*l*. 5*s*. 3*d*. ½ 138/453.

A Merchant delivered at LONDON 120*l*. Sterling; to receive 147*l*. *Flemiſh*, in AMSTERDAM; how much was 1*l*. valued at in *Flemiſh* Money.

l. *l*. *l*.
If 120—147—1

120)147(1*l* 4*s* 6*d*. Anſ.
120
27
20
120)540(4
480
60
12
120)720(6
720
0

Or thus.

l.
12|0)14|7

£. 1—27
20
12)540
s. 4—6

Anſwer, 1*l*. 4*s*. 6*d*. the ſame as before.

CASE VIII.

Compariſon of *Weights* and *Meaſures*.

If 112*lb*. at LONDON make 99*lb*. at LISBON, how many *lb*. at LONDON are equal to 1049*lb*. at LISBON.

lb. *lb*. *lb*.
If 99—112—1049
112
2098
11539
lb.
1ſt *No*. 99)1174488(1186$\frac{74}{99}$ Anſ.
99
184
99
858
792
668
594
74

If 112*lb*. at LONDON make 98*lb*. at ROAN, how many *lb*. at ROAN are equal to 1000*lb*. at LONDON.

lb. *lb*. *lb*.
If 112—98—1000
98
8000
9000
lb.
1ſt *No*. 112)98000(875*lb*. Anſ.
896
840
784
560
560
0

If

If 100 Ells *Engliſh*, make 108 Braces at *Venice;* how many Ells *Engliſh* are equal to 1000 Braces at *Venice*.

Braces Ells. Braces.
If 108—100—1000
100.

108 = { 12)100000
9)8333-4

Anſ. $925-\frac{100}{108}$

If 100 Ells at LONDON make 145 Ells at VIENNA; how many Ells at VIENNA are equal to 10 Ells at LONDON.

Ells. Ells. Ells.
If 100——145——10
20

1|00)14|50.

Anſ. $14\frac{1}{2}$ Ells.

POSITION.

POSITION is ſo called becauſe we ſuppoſe ſome uncertain or falſe numbers, in order that by reaſoning from them, according to the nature thereof, do by thoſe falſe ſuppoſed numbers, find the true number ſought.

This RULE is divided into two Parts, commonly called the SINGLE RULE, and DOUBLE RULE.

Single POSITION.

By SINGLE POSITION are anſwered all ſuch Queſtions, as require only one ſuppoſition to diſcover the true reſult.

RULE.

Make choice of your *Poſition* work with that ſuppoſition, according to the nature of the Queſtion, as if it were the true number, and if you find (after ordering your *Poſition*) the reſult either too much, or too little, you may then find the true anſwer by this Proportion, *(viz.)*

As the Reſult of your *Poſition*, is to the *Poſition*; ſo is the given number to the number ſought.

PROOF.

Add the feveral parts of the fum together, and if the fum agrees with the given number, it is right.

At a certain School if you add $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, of the number of the Scholars together, the fum will be 76, Quere the number of Scholars.

Suppofe 100

$\frac{1}{2}=50$
$\frac{1}{4}=25$
$\frac{1}{5}=20$

As 95—100—76

100

95)7600(80
760
0

Anf. 80 Scholars.

Or 95—76—100

76

600
700

95)7600(80
760
0

Anf. 80 fame as before.

No=80

$\frac{1}{2}=40$
$\frac{1}{4}=20$
$\frac{1}{5}=16$

76
Proof.

Two Men *A*, and *B*, having found a bag of Money, difputed who fhould have it, *A*, faid the $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, of the Money made 130*l*. and if *B*, could tell how much was in it, he fhould have it all, otherwife he fhould have nothing; I demand how much was in the Bag.

Suppofe 60

$\frac{1}{2}=30$
$\frac{1}{3}=20$
$\frac{1}{4}=15$

As 65 is to 60 fo is 130 to the number fought.

60

65)7800(120
65

130
130
0

Anf. 120*l*.

l.
No. 120

$\frac{1}{2}=60$
$\frac{1}{3}=40$
$\frac{1}{4}=30$

Proof, 130

Queſtion

Queſtion by Mr. *Thomas Sadler*, ſee his *Arithmetic* Page 430.

An old woman of above threeſcore and ten,
Has buried four huſbands and married again,
To *Jerry* the mug-man, a bagpiper rare,
And none can with him for his muſic compare:
The muſic he play'd pleas'd the old woman much,
'Till ſhe hopp'd and ſhe caper'd about without crutch:
Though wrinkled and wither'd, no tooth in her head,
Yet money ſhe had, and ſhe got married:
To his bagpipes ſhe mov'd, with one foot in the grave,
For all her delight was a huſband to have:
The ſum of both ages one hundred Years are,
Wanting five; and one fourth of her age I declare,
'Tis the age of her huſband; now *Tyro* you'll find,
The bagpipers age with his ſpouſes ſo kind.

Suppoſe 80 to be the wifes age.

Then *per* Queſtion 20 would be the huſbands.

100

The ſum therefore is 100, which by the Queſtion ſhould have been only 95, therefore

As 100——80——95

80 *middle number*.

1|00)76|00

76 the wifes.

Then *per* Queſtion, 19 = the huſbands.

95 Proof.

Double POSITION.

IS when two ſuppoſitions are uſed, and if we miſs in both (as it generally happens) obſerve the nature of the Errors, whether they be greater or leſs than the given number, and accordingly they muſt be made uſe of thus.

RULE.

RULE.

I. Place the Error againſt its reſpective Poſition, and multiply them croſs-ways.

II If the Errors are alike, that is, both greater or both leſs than the given number, take their difference for a Diviſor, and the difference of their Product for a Dividend.

But if unlike, that is, one too much, and the other too little, then take their ſum for a Diviſor, and the ſum of their Products for a Dividend, the Quotient will be the Anſwer.

A, *B*, *C*, would divide 100*l* between them, ſo as *B*, may have 3*l*. more than *A*, and *C*, 4*l*. more than *B*, I demand how much each man muſt have.

	l.		
Suppoſe *A*,	15	Suppoſe *A*,	20
then *per* Q. *B*,	18	Then *B*,	23
And *C*,	22	And *C*,	27
	— 1*ſt* Error.		— 2*d*. Error.
Sum	55=45 too little	Sum	70=30 too little.

Errors.

Suppoſe 15 X 45
20 X 30

As 900— 450=45 and 450——30=15

Then 450÷ by 15

l.

15)450(—30 *A's*
45 33 *B's* } Anſwer.
37 *C's*

100 Proof.

A, *B*,

A, *B*, and *C*, built a houſe which coſt 100*l*. of which *A*, paid a certain ſum, *B*, paid 10*l*. more than *A*, and *C*, paid as much as *A*, and *B*: I demand each man's ſhare in the charge.

	l.		*l.*
Suppoſe *A*,	10	Suppoſe *A*,	12
Then *B*,	20	Then *B*,	22
And *C*,	30	And *C*,	34
	— 1*ſt*. Error.		—— 2*d*. Error.
Sum	60=40 too little	Sum	68=32 too little

Sup. Error.

10 X 40

12 32

480—320=160 and 40——32=8

Then 160÷ by 8.

8)160

20 *A's* Share,	Anſ.
30 *B's* Share,	
50 *C's* Share,	
100 Proof.	

Of various forms of *Acquittances*, *Promiſſory Notes*, *Bills* of *Exchange*, *Letters* of *Advice*, *Letters* of *Credit*, &c.

A General Receipt.

Received of Mr. *A*, *B*, the Sum of Fifty Pounds in full for *&c*. and of all demands.

50*l*. 0*s*. 0*d*. by me *J. B.*

A

A Receipt or Acquittance for Rent paid.

Received this 10*th* day of *April*, 1775 of Mr. *E. F.* the Sum of thirty two Pounds ſixteen Shillings, in money, which with four Pounds four Shillings more, diſburſed by the ſaid *E. F.* for Taxes and reparations of the Meſſuage, *&c.* he now occupies, makes in the whole the ſum of Thirty ſeven Pounds, and is in full of a half Years Rent, due to me out of the ſaid Premiſes, at *Lady-Day* laſt, I ſay received

37*l.* by me I, B.

An Acquittance for debt received of a third hand.

Received this 10*th* day of *April*, 1775, of Mr. *A. B.* by the hands af *J. S.* the ſum of ſix Pounds ten Shillings in full, for certain Goods *&c.* bought by the ſaid *A. B.* of me, I ſay received in full of all demands,

6*l.* 10*s.* by me *J. B.*

Received *April* 11*th* 1775, of Mr. *Simon Sims*, twenty Pounds ten Shillings in full for my Maſter, *Ben. Joice.*

20*l* 10*s.* *per* me *Andrew Hulſe.*

Received 12*th May* 1775, of Mr. *Jacob Jenks* twelve Pounds four Shillings and ſix-pence on account of Goods ſold him,

12*l.* 4*s.* 6*d.* *per* me *Godfrey Goodall.*

Received 12*th May*, 1775, of Mr *John Richardſon*, twenty five Pounds fifteen Shillings in full of all demands.

25*l.* 15*s.* *per Jonathan Tailer.*

The form of *Promiſſory Notes*, or common *Notes* for Money.

I Promiſe to pay to *A. B.* or Order, the Sum of twenty Pounds on demand, for value received, Witneſs my hand this 12*th* day of *May*, 1775.

20*l.* *J. B.*

London, *April* 11*th.* 1775.

Three Months after date, I promiſe to pay to Mr. *Henry Hearty*, or order, the ſum of ten Pounds, for value received.

10*l.* *per* me *John Joy.*

I Promiſe to pay to Mr. *Timothy Teager*, Sixty Pounds on the 20*th* of this Inſtant *April*, as witneſs my hand this 2*d*. day of *April*, 1775,

60*l*. *Daniel Towres.*

I promiſe to pay Sir *A. B.* or order the ſum of thirty-ſix Pounds, in the manner following, ten Pounds, part thereof, three months after date, ſixteen Pounds more the 20*th* of *Auguſt* next, and the remaining ten Pounds, the 19*th* of *October* next following, for value received, witneſs my hand at *Newcaſtle-under-Lyme*, the 12*th* of *April*, 1775.

36*l*. *T. W.*

I promiſe to pay to Mr. *James Jennings* or order, ten Pounds, for value received, on demand, witneſs my hand this 12*th* day of *May* 1775.

10*l*. *Robert Buck.*

Neceſſary obſervations on Promiſſory Notes.

Promiſſory Notes for a valuable conſideration, ſhould always mention for value received, if the thing itſelf be not ſpecified; this gives them validity in a Court of Judicature.

A Promiſſory Note, mentioning order, is indorſible from one Perſon to another, which is done by the preſent poſſeſſors writing his name on the back of it, and delivering it up to the party to whom he intends to aſſign over his property therein.

It is unneceſſary to have a Promiſſory Note payable to bearer indorſed, if you are ſatisfied the Note is good.

The delivering up a Promiſſory Note to the Perſon who ſigned it, is a ſufficient voucher of its being paid, nor is there any need of writing a Receipt thereon.

Promiſſory Notes, and book debts, if not legally demanded in the ſpace of ſix Years, cannot be recovered by Law.

If you have a Promiſſory Note on demand, in your own hands above three days, and the Perſon it is upon ſhould fail, the loſs will be your own, but if he fail within the three days, it will light in Equity, on the Perſon that paid it you.

Forms of Inland *Bills* of *Exchange.*

100*l.* *Newcaſtle, April* 10*th.* 1775.

At ſight pay Mr. *P W.* or order, the ſum of one hundred Pounds the value received of *I. B*, and place it to account, as *per* Advice from,

To Mr. *C. D.* at the *Horſe Guards, Whitehall, London.* *A. B.*

70*l.* *London, March* 20*th.* 1775

At ten days ſight pay Mr. I. *W.* or order, the ſum of ſeventy Pounds, for value received, of *Dennis Lloyd* Eſq; and place it to account as *per* Advice from

To Mr. *Dumfrees,* Clothier, *Saliſbury,* *I. B.*

Of Foreign *BILLS.*

London, April 13*th.* 1775, *for Crowns* 500 *at Uſance.*

At *Uſance*, pay this firſt Bill of Exchange to Mr. *Samuel Seldom*, or order, five hundred Crowns, for value received here of Mr. *Laurence Leith*, and place it to account, as *per* Advice from,

To Mr. *Thomas Steel,* Merchant at *Paris.* *John Jacobs.*

The Second BILL.

London, April 13*th.* 1775, *for Crowns* 500 *at Uſance.*

At *Uſance*, pay this my ſecond Bill of Exchange, my firſt not being paid, to Mr. *Samuel Seldom* or order, five hundred Crowns, for the value received here of Mr. *Laurence Leith*, and place it to account, as *per* Advice from,

To Mr. *Thomas Steel,* Merchant at *Paris.* *John Jacobs.*

So the third Bill (excepting the firſt and ſecond) muſt be drawn.

Orders

ORDERS for GOODS.

Orders are generally given by Letters from one Trader to another, which Letters ſhould be very plain and expreſs, and nothing ſhould be preſumed, imagined, or expected, that is not fully ordered.

The Correſpondent muſt be very exact in following orders, and punctual in anſwering every Article.

Newcaſtle-under-Lyme, 14*th April*, 1775.

Mr. *John Jenks*.

Pleaſe to ſend by the return of the Carrier, the following Goods to

your humble Servant,
Laurence Lazy.

3 Pieces of Broad Cloth, Superfine.
2 Pieces of Black, Ditto.
4 Pieces of Scarlet Duffels.
2 Ditto. Grey Serge.
3 Ditto. of light Durans.
4 Ditto. of Cinnamon Sagothies.

The Goods being pack'dup and ſent to the Carrier, and the parcel book'd, *Jenks* writes to *Lazy* thus,

London, *April* 15*th*. 1775.

Mr. *Laurence Lazy*.

Sir.

I this day have ſent you by *Charles Pye*, (according to your order) the following Goods. *(viz)*

3 Pcs. S. fine Qt. 106 *Yds*. at 15*s* 6*d*. *per*	82	3	0
2 Pcs. black dit. 71 Yards at 15*s*. *per* Yard.	53	5	0
2 Pcs. Grey Serg at 1*l*, 15*s*. *per* Piece.	3	10	0
3 Pcs. Durans. at 1*l*. 10*s*.	4	10	0
4 Pcs Sagothies, at 1*l* 8*s*.	5	12	0
4 Pcs. Duffels, at 2*l*. 5*s*.	9	0	0
£.	158	0	0

The above Goods are well pack'd, and hope you'll receive them ſafe, and to your approbation.

I am *Sir*. your very humble Servant, *John Jenks*.

The laſt Example may be ſufficient to give an Idea of Orders ſent and received, but the particular caſes that daily occur in Trade, cannot be fully exhibited.

LETTERS of CREDIT.

Sir, *London. April* 13*th.* 1775.

The bearer, Mr. *John Bromfield*, being on his Travels in your Parts, may have occaſion for Money; pleaſe to furniſh him as his occaſions require, taking his Receipts, and your draughts for the value, ſhall receive due honour, from

To Mr. *Humphry Simkins*, Banker in *Paris*. your humble Servant, *Caleb Lloyd*.

Sir, *Paris*, *April* 14*th.* 1775.

The bearer, Monſ. *D. B.* will have occaſion for ſixty Pounds; I requeſt you would advance him the ſaid ſum, or ſuch part of it as he may require, and take his Bill on me for the ſame.

To Mr. *Simon Thrifty*, Merchant in *London*. I am, *Sir*, your hum. Servant, *L G.*

N. B. A Letter of Credit fully expreſſes its meaning, and therefore needs no farther explanation.

INVOICES.

Invoices ſhew the Coſt and Charges on Goods ſent by Sea, from one place to another, like a Bill of Parcels among Tradeſmen.

The Perſon who ſends the Invoice is called the Factor, who is employed by the Merchant abroad, to buy, ſell, remit, ſhip, and pay charges on Goods ſent him from hence, or brought hither.

Such Factor is allowed a certain Rate *per Cent*, for his trouble; which is called *Commiſſion*, and is paid by the imployer.

Invoice

Invoice of Merchandise shipped on board the *Hopewell*, *John Gorden* Master, consigned to Mr. *William Boyd*, Merchant in *Jamaica*, on my own proper account and risque.

No. 1. *I. C.*						
A Hogshead contains,	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
3 Pieces of Dowlas at 80*s.*	12	0	0			
2 Pieces of ditto, at 105*s.*	10	10	0			
1 Piece of Lockrams,	3	5	0			
10 Pcs. of Stripes *Qt.* 179 *Ells* at 10*d.* ¼, *per Ell.*	7	12	10 ¾			
No. 2.				33	7	10 ¾
A Hogshead contains.						
20 Pcs. Cotton Checks *qt* 361 *Ells*, at 12*d per Ell.*	18	1	0			
22 Pcs. of Linen dit. 463 *Ells* at 10*d. per Ell.*	19	5	10			
No. 3.				37	6	10
A Hogshead contains.						
20 Pcs. Cambricks at 63*s.*	63	0	0			
10 Pcs. of Irish Linen *qt.* 327*yds.* at 2*s* 6*d. per.*	40	17	6			
				103	17	6
Cartage 7*s* 6*d.* Porterage 13*s* 8*d.* Packing, 15*s.* 9*d.*	1	16	11			
Cooperage 2*s* 3*d.* Casks 45*s* Expences 3*s* 7*d.*	2	10	10			
Freight and Primage.	9	17	4			
Errors excepted.				14	5	1
At *Liverpool*, 27*th April*, 1775, *per John Careful.*				£. 188	17	3 ¾

Note, Errors excepted, signifies that if any errors or omissions have passed unobserved, they are no more than oversights, and not intended to the prejudice of either party.

Thus

Thus every particular is charged, and the Invoice written on the half ſheet of paper, that it may appear at one view.

Merchants have particular marks, ſome a Grape, others a Star, &c. and every man is careful not to uſe anothers mark on his Goods.

Goods are put up in Bales, Caſks, Bags, Boxes, &c. which are all numbered 1, 2, 3, &c, and marked with the particular mark the Merchant uſeth.

Our Britiſh Merchants Foreign Trade purſue,
They vend our Goods and bring us riches too.

Letters *of* Correſpondence.

The firſt buſineſs a Youth is put upon in a Merchants compting-Houſe, is the copying of Letters; which is certainly the moſt effectual way to make him acquainted with Trade, and give him a proper Idea of dealing in the World.

As to forms of ſuch Letters, they would be as numerous, as the various affairs of men are; ſo that all the Examples of what does, or may occur in human life, would make a Volume as large as the Univerſe.

However ſome examples may aſſiſt the Induſtrious, and ſuch as have not the advantage of being brought up under a conſiderable Trader, may gain a little experience and Information.

A Letter, with an Order for Goods.

Newcaſtle, April 27th, 1775.

Mr. *John Ellis.*

I have yours of the 23*d* paſt, with the account incloſed, I ſhall by the next Poſt remit you a Bill for 127*l.* and deſire you to ſend me the next return, by *John Joy*, 5 Pcs. of ſuperfine grey broad Cloth, and 3 Pcs. of Holland about 8*s* 6*d per* Ell.

I have been with Mr. *Thompſon*. who ſays he ſhall ſee you next week.

To Mr. *John Ellis*, in *Cheapſide*, *London*. I am your humble Servant, *Theodore Hulſe*.

Anſwer to the foregoing Letter.

London, *May* 2*d*. 1775.

Mr. Theodore Hulſe.

Yours of the 27*th* Inſtant I received, as alſo of the 29*th*. covering a Bill value 127*l*. whis is paid and placed to your Account.

I have this day ſent you by *John Joy*, according to your Order.

3 Pieces of fine Holland Qt. 47 Ells, at 8*s*. 6*d*. *per* Ell.
5 Pieces of S, fine grey Cloth, Qt. 108 Yards, at 16*s*. *per* Yard.

To Mr. *Theodore Hulſe*, Draper, *Newcaſtle*. Your humble Servant, *John Ellis*.

If an Apprentice or Servant, receives a Letter with Orders, he (being commiſſioned ſo to do) obeys the Orders therein thus.

London, *May* 2*d*. 1775.

Mr. *Theodore Hulſe*.

Sir.

My Maſter being out of Town, your of the 27*th*. came to my hands, as alſo of the 29*th*. covering a Bill value 127*l*. which I have received, and placed to your Account. The Order is this day ſent you by *John Joy*, *(viz.)* as before. I am, *Sir*, your humble Servant, *Iſaac Truſty*, Servant to Mr. *Ellis*.

A Letter to a FACTOR.

London, *April* 27*th*. 1775.

Mr. *Daniel Dimming*,

Pray ſend me as ſoon as you ſee convenient, 60 Pcs. of your beſt Linen, and draw on me for the Amount,

To Mr. *Daniel Dimming*, in *Dublin*. your humble Servant, *Hugh Short*.

The

The FACTORS Anſwer.

Dublin, May 17th. 1775.

Sir.

I have ſent you by the *Peacock*, Captain *Richard Boyd*, 60 Pieces of very good *Iriſh* Linen; I think not inferior to any production of *Holland*: the Invoice and Bill of Lading are incloſed, as alſo a Bill for the Charge, payable in 30 days.

I ſhall have occaſion to draw on you for 100*l.* in about 6 weeks time, which I requeſt you'd honour.

To Mr. *Hugh Short*, Draper in *Cornhill*, *London*. I am your humble Servant, *Daniel Dimming*.

NOTATION of VULGAR FRACTIONS.

A FRACTION, or broken number, is that which repreſents a part, or parts of any thing propoſed, and and is expreſſed by two numbers placed one above the other, with a line drawn betwixt them.

Thus $\left\{\begin{matrix} 3 \text{ Numerator.} \\ \hline \\ 4 \text{ Denominator.} \end{matrix}\right.$

The Denominator or number placed underneath the line, denote how many equal parts the thing is ſuppoſed to be divided into, (being only the Diviſor in *Diviſion*) and the Numerator, or number placed above the line, ſhews how many of thoſe parts are contained in the Fraction,

(it being the remainder after the division is ended) and these admit of three distinctions.

viz. { Proper or Simple / Improper / Compound } Fractions.

A proper, pure, or simple Fraction, is that which is less than an unit; that is, it represents the immediate part or parts of any thing less than the whole, and therefore it's Numerator is always less than the Denominator.

And, $\frac{1}{4}$ is one fourth part. | $\frac{2}{3}$ is two thirds.
$\frac{1}{2}$ is one half. | $\frac{4}{5}$ is four fifths.
$\frac{3}{4}$ is three fourths or 3 quarters.

An improper Fraction is that which is greater than an unit; that is, it represents some number of parts greater than the whole thing, and it's Numerator is always greater than the Denominator. As $\frac{3}{2}$ or $\frac{5}{3}$ or $\frac{9}{7}$ or $\frac{9}{8}$.

A compound Fraction is a part of a part, consisting of several Numerators and Denominators annexed together, with the word *(of.)* As $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{7}{8}$ *&c.* and are thus read, two thirds, of three fourths, of seven eights of an unit.

That is, when a unit (or whole thing) is first divided into any number of equal parts, and each of those parts are subdivided into other parts, and so on, then those last parts are called Compound Fractions, or Fractions of Fractions.

As for Instance, suppose a Pound Sterling, (or 20*s.*) be the unit or whole, then is 17*s* 6*d.* the $\frac{1}{8}$ of it, and $\frac{3}{4}$ of that is 13*s* 1*d.* $\frac{1}{2}$, and $\frac{2}{3}$ of that is 8*s* 9*d.* equals $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{7}{8}$ of a Pound Sterling; which 8*s* 9*d.* is the Answer.

See the Work in the next Page.

20
7
8)140
17-6=⅞ of a Pound.
3
4)52-6
13-1½=¾ of ⅞ of a Pound.
2
3)26-3
Answer, 8-9=⅔ of ¾ of ⅞ of a Pound.

REDUCTION *of* Vulgar Fractions.

BY REDUCTION we bring Fractions into their lowest equivalent parts, and into common Denominators, or into one Denomination.

By *Reduction* we find the value of any Fraction in the known parts of an Integer, reduce whole or mix'd numbers into improper Fractions, and the contrary, as likewise compound Fractions into Single, of these in their order.

To bring Fractions into their least equivalent parts may be performed several ways, a general Rule for which is either of those that follow.

First, divide the denominator by the Numerator, and the Divisor by the Remainder if any be, thus doing 'till you find nothing to remain; your last Divisor is the greatest common measure sought, or divide the Denominator by the Numerator, and likewise by the Remainder, as long as there is any, the last Divisor is your greatest common Measure sought as before.

By which, dividing your Numerator and Denominator reduceth your given Fractions into its least parts.

Note. If your last Divisor be an unit, the Fraction is in its least terms at first, so dividing it will bring it no nearer than it was at first.

What

What's the greateſt Common Meaſure of $\frac{72}{108}$.

72)108(1
72
36)72(2
72
0

Anſwer, 36 is the greateſt number or common meaſure that will divide both Numerator and Denominator, without a Remainder.

Therefore $\left\{\begin{matrix}36\\36\end{matrix}\right\}\left\{\begin{matrix}72 \mid 2\\108 \mid 3\end{matrix}\right.$ So $\frac{2}{3}$ is the loweſt Terms of $\frac{72}{108}$.

What is the greateſt Common Meaſure of $\frac{96}{217}$.

96)217(2
192
25)96(3
75
21)25(1
21
4)21(5
20
1)4(4
4
0

Note. In this Example the common meaſure is an unit, ſo the Fraction is in its loweſt Terms already.

Reduce $\frac{204}{228}$ to its leaſt Terms.

204)228(1
204
24)204(8
192
12)24(2
24
0

12)204
17

12)228
19

Anſwer, $\frac{17}{19}$.

When several Fractions are given to be reduced into other equivalent Fractions, having a common Denominator, use this Rule.

Multiply every Numerator into each Denominator continually, except its own, which shall be a new Numerator: then multiply all the Denominators into one another for a common Denominator, and the work is finished.

Let $\frac{3}{4}$ $\frac{5}{8}$ and $\frac{11}{12}$ be changed into one Denomination.

12	3	5	11
8	8	5	8
96	24	25	88
5	12	12	5
480 = Denomin.	288	300	440

$\frac{288}{480}$ $\frac{300}{480}$ and $\frac{440}{480}$ new Fractions.

To bring mix'd numbers into Fractions, and the contrary.

Mix'd numbers are brought into improper Fractions by this Rule.

Multiply the Integers, or whole numbers, by the Denominator of the given Fraction, and to their Product add the Numerator, the sum will be the Numerator of the Fraction required.

Let $9\frac{4}{5}$ be brought into an improper Fraction.

Thus $9\frac{4}{5}$

5

$\frac{49}{5}$ the Fraction required.

To find the true value of any improper Fraction given, is only the reverse of this Rule, for $\frac{49}{5} = 9\frac{4}{5}$, as before is evident. Then it follows, that 49 be divided by 5, the Quotient will be 9, and 4 will remain; which is thus expressed $9\frac{4}{5}$.

To

To reduce Coins, Weights, Meaſures, *&c.* into Fractions.

Suppoſe 6*s.* 4*d.* were to be reduced to the Fraction of a Pound Sterling. This no more than to make the Pence in 6*s* 4*d.* the Numerator to 240 the Pence in a Pound.

s.	*d.*
6	4
12	

76 *N.* then $\frac{76}{240}$ is the Fraction required, $= \frac{19}{60}$ in its loweſt Terms.

Reduce 6*d.* $\frac{1}{2}$ to the Fraction of a Shilling;

d.
6 $\frac{1}{2}$
2

13 *N.* Anſwer, $\frac{13}{24}$.

B.	*Pts.*
Reduce 2	14
40	

94 *N.* Anſ. $\frac{94}{160} = \frac{47}{80}$ in its leaſt Terms.

Reduce 4*C.* 1*qr.* 12*lb.* to a Fraction of 1*C.* Weight.

4

37

28

148

34

N. 488 Anſ. $\frac{488}{112} = \frac{61}{14}$ in its leaſt Terms

Note. After the ſame manner may any other Weights, Meaſures, *&c.* be reduced to Fractions.

When Fractions are to be reduced to other equivalent ones of a different Integer, *i. e.* when the given Fraction is to be brought from a greater to a leſs Denomination, or from a leſs to a greater, obſerve the following Rule.

If a leſs Denomination is ſought, to be brought from any greater, multiply the Numerator by the Integral parts, you'll ſoon deſcry a new Numerator, to its Denominator, and when a greater is required, you muſt multiply the Denominator by thoſe parts.

Reduce $\frac{4}{12}l.$ to an equivalent Fraction of a Penny.

4
20
—
80
12
—
960 N. Anſ. $\frac{240}{12} = \frac{80}{4}$ in its leaſt Terms.

Reduce $\frac{3}{4}lb.$ Troy, to the Fraction of a Pennyweight.

3
12
—
36
20
—
720 N. Anſ. $\frac{720}{1}$

Reduce $\frac{8}{12}$ of a Shilling to the Fraction of a Farthing.

8
12
—
96
4
—
384

Anſ. $\frac{384}{12} = \frac{192}{6} = \frac{96}{3} = \frac{48}{1}.$

Reduce

Reduce $\frac{18}{160}$ of a Farthing to the Fraction of a [illegible]

160
4

640
12

7680
20

153600 D. Anf. $\frac{18}{153600} = \frac{3}{25600}$ in its leaſt Terms.

See the above Fraction reduced to its leaſt Terms.

18)153600(8533
144

96
90

60
54

60
54
---

6)153600	6)18	
25600	3	

Anf. $\frac{3}{25600}$ the ſame as above.

Greateſt Com. Meaſ. 6)18(3
18

0

Reduce $\frac{4}{12}$ of a *lb.* to the Fraction of a *C.* weight.

12
28

336
4

1344

Anf. $\frac{4}{1344} = \frac{1}{336}$ in its leaſt Terms.
or by compound Fractions $\frac{4}{12}$ of $\frac{1}{28}$ of $\frac{1}{4} = \frac{4}{1344}$ as before.

 Reduce

Reduce $\frac{5}{7}$ of a Guinea to the Fraction of a Pound.

$$\frac{5}{21} \quad \frac{7}{20}$$

N. 105 140 D.

Anſ. $\frac{105}{140} = \frac{21}{28} = \frac{3}{4}$ in its leaſt Terms.

To find the value of any vulgar Fraction in the known Parts of the Integer.

Multiply the Numerator of the Fraction given, by the known parts of the next inferior Denomination, which Product divided by the Denominator, quotes the parts of that Denomination ſought, the remainder if any, multiply'd by the parts of the next inferior Denomination, and divided as before, gives the parts of the next Denomination; and thus you may do 'till you have brought it into the leaſt known parts, or 'till nothing remains.

What's the valpe of $\frac{7}{8}$ of a Pound Sterling.

7 Numerator.
20

Denom. 8)140

l. 17—4
12

8)48

d. 6

Or thus.

7 Numerator.
20

l. *d.*

D. 8)140(17 6 Anſ. the ſame as before
8

60
56

4
12

8)48(6*d.*
48

0

What's

What is the value of $\frac{5}{8}$ of 8*s.* 10*d.*

s.	*d.*	
8	10	
	5	
8)2	4	2
s. 5	6	$\frac{1}{4}$ Anſ.

What's the value of $\frac{56}{84}$ of a Ton Weight.

56 Numerator.
20

D. 84)1120(13 Hundreds.
84

280
252

28
4

84)112(1 Quarter.
84

28
28

224
56

84)784(9 Pounds.
756

28
16

84)448(5 Ounces.
420

28

After the ſame manner may the value of any Weight and Meaſure, or any thing of whatever Denominations, (taking heed to the Rule before going) be found.

To reduce a Compound Fraction, to a Single one of the ſame value.

Multiply all the Numerators one into another for a new Numerator, and the Denominators one into another for a new Denominator, ſo you have the ſingle Fraction ſought.

So if $\frac{2}{3}$ of $\frac{5}{8}$ were reduced into a ſingle Fraction, it would be $\frac{5}{16}$, and $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$ would be $\frac{6}{24}$, or $\frac{1}{4}$.

Reduce $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{5}{7}$ to a ſingle or ſimple Fraction.

2	3
3	4
6	12
5	7
30 N.	84 D.

whence $\frac{30}{84}$ is the Anſwer.

Reduce the above Fraction to its leaſt Terms.

30)84(2
60

24)30(1
24

6

Greateſt Com. Meaſ.	6)84	6)30
6)24(4	14	5
24		
0	Anſ. $\frac{14}{5}$ leaſt Terms.	

Notation of *Decimal* FRACTIONS.

NOTATION of DECIMALS is different from that of whole numbers, for whole numbers increaſe from the right hand towards the left, in a tenfold proportion from unity or one, and Decimals decreaſe from unity, in the ſame proportion, from the left hand towards the right; the following Table makes this evident.

Unit

Units	1.	Units one Integer.
Primes	.1	One tenth part of the Integer.
Seconds	.01	One Hundredth part.
Thirds	.001	One Thousandth part.
Fourths	.0001	One ten Thousandth part.
Fifths	.00001	One Hundred thousandth part.
Sixths	.000001	One Millionth part.
Sevenths	.0000001	One ten Millionth part.
Eights	.00000001	One Hundred Millionth part.
Ninths	.000000001	One Thousand Millionth part.

So that *Decimal Fractions* are of several Denominations or names, as Primes, Seconds, Thirds, *&c.* and becauſe the Denominator is always 1, with as many Cyphers annexed as there are Decimal Places, for this reaſon the Numerator or Decimal is always wrote alone without the Denominator, ſo if I would expreſs twenty five hundred parts of any thing which vulgarly ſtands thus $\frac{25}{100}$, becauſe the Denominator is 1, with as many cyphers prefix'd, as there are Decimals or places in the Numerator, it is always expreſſed thus .25; and $\frac{123}{1000}$ thus .123; and $\frac{5382}{10000}$ thus .5382, *&c.* and becauſe *Vulgar Fractions* are the foundation of *Decimals*, it is neceſſary to ſhew how to reduce a *Vulgar Fraction* to a *Decimal*.

Reduction of *Decimal Fractions.*

To reduce a *Vulgar Fraction* to a *Decimal Fraction*

RULE.

Annex to the Numerator of the given *Vulgar Fraction*, any number of Cyphers at pleaſure, and divide that ſum by the Denominator, the Quotient is the *Decimal*, equal to the given *Vulgar Fraction*.

For as the Denominator of the given *Vulgar Fraction*, is to the Numerator, ſo is an unit with ſo many Cyphers annexed, as you intend your *Decimal* ſhall have places, to the *Decimal* required.

I. Reduce $\frac{1}{4}$ to a Decimal.

4)1.00

25 Anſ. the Decimal.

II. Reduce $\frac{1}{2}$ to a Decimal.

2)1.0

.5

III. Reduce $\frac{3}{4}$ to Decimal.

4)3.00

.75

IV. Reduce $\frac{11}{80}$ to a Decimal.

80)11.0000(.1375 Anſ

80

300

240

.600

.560

.400

.400

0

Or thus.

80)11.000|0

.1375 the ſame as before.

The firſt Example is wrought thus by the *Sliding Rule*. Set 4 upon *B*, to 1 upon *A*, and againſt 100 upon *B*, is 25 upon *A*, the Decimal ſought.

But more of the *Sliding Rule* hereafter.

To

To Reduce a Compound *Vulgar Fraction*, to a *Decimal*.

Reduce $\frac{1}{2}$ of $\frac{1}{2}$ of $\frac{1}{2}$ to a Decimal.

Reduce them to a ſingle Fraction by multiplying all the Numerators together, for a new Numerator, which make 30; then Multiply all the Denominators together which make 120; which placed under the other is this ſingle Fraction $\frac{30}{120}$, or $\frac{1}{4}$ — $\frac{1}{4}$, whoſe Decimal will be found, .25 as before. See the Work.

120)30.00(.25 Anſ.
24 0
.600
600
0

Or thus.
12|0)30.0|0
.25 Anſ. ſame as before.

Reduce $\frac{1}{4}$ of $\frac{1}{2}$ of $\frac{3}{4}$ of any thing to a Decimal.

By the directions before given I find it to be this ſingle Fraction, $\frac{3}{32}$.

32)3.00000(.09375 Anſ.
2 88
.120
96
.240
224
.160
160
0

Or thus.
* 8)3.00000
4)37500
.09375 ſame as before.

* *Note.* In this Example I take the parts for 32, *(viz.)* 4 and 8, for 4 x 8 = 32.

In every Quotient that ariſes in finding a *Decimal Fraction*, there muſt be as many Decimal places as you annex Cyphers to the Numerator of the given *Vulgar Fraction*; and what places fall ſhort, muſt be ſupply'd by prefixing Cyphers to the left hand of the Decimal, Thus in the Example

ample above, there is one Cypher prefixed on the left hand of the Quotient 9375, ſo that the true Quotient or Decimal is .09375.

In finding the Decimal of Money, Weights, Meaſures, Time, Motion, *&c.* you muſt reduce what you are ſeeking the Decimal of, into the loweſt name mentioned, and divide by what you deſign for the Integer, reduced into the ſame name; and the Quotient thence ariſing is the Decimal ſought.

Example in *Engliſh* Money.

Whats's the Decimal of 1*s.* a Pound being the Integer.

It is this *Vulgar Fraction* $\frac{1}{20}$.

Then 2|0)1 0|0 or 20)1.00(.05 the ſame as before.

1 00

.05

What's the Decimal of 1 Farthing, a Pound being the Integer.

It is this Compound *Vulgar Fraction*, $\frac{1}{4}$ of $\frac{1}{12}$ of $\frac{1}{20} = \frac{1}{960}$.

960)1.00000000(.00104166 Anſwer.

960.

.4000
3840

.1600
960

.6400
5760

.6400
5760

.640

After the above manner, is the common Decimal Table of money calculated in moſt Books treating of Decimals. Thus

Thus if you require to find the Decimal of 12*s*. 9*d*. $\frac{1}{2}$ a Pound being the Integer, the work will ſtand thus.

s. *d*.
12 9 $\frac{1}{2}$
12

153
4

960)614.0000000(63958333 Anſ.
576 0.

.38 00
28 80

.9 200
8 640

.5600
4800

.8000
7680

.3200
2880

.3200
2880

.3200
2880
320

Or thus.
4(2.0

12)9.5

20)12.7916666

An . .63958333 the ſame.

See the difference of the Work.

To proceed in this laſt Method, I add Cyphers to the loweſt Denomination, making a dot between the Cyphers and the Figure, then divide by the parts contained in the next higher denomination then place the next higher Denomination before that Quotient, with a dot

dot between, and divide by the parts contained in the next higher Denomination, and ſo go on, and your laſt Quotient will be the Decimal required, in like manner may any other Examples of the ſame kind be wrought.

TROY WEIGHT.

What's the Decimal of 9*oz.* 12 *wt.* 20*gr.* a Pound weight being the Integer.

Operation. *oz.* *dwt.* *gr.*

9 12 20

20

192

24

768

grains in a pound. 386

5760)4628.000000(.803472 the Anſwer.

4608 0

20000

17280

27200

23040

41600

40320

12800

11520

1280

Note. It frequently happens that Decimals will not terminate, but that there will ſtill be a remainder, (as in this Example) but if the Decimal be continued to 4 or 5 places, it will be exact enough in moſt caſes, and the remainder may be ſafely rejected, as being ſo very inconſiderable.

Or thus. 8)20.0

3)2.5

2|0)12.833333|3

12)9.641666

Anſ. the ſame as before. .803472

See the explanation to the laſt Example.

Apothe-

APOTHECARIES WEIGHT.

What's the Decimal of 10oz. 6dr. 1scr. 12gr. a Pound being the Integer.

oz.	dr.	scr.	gr.
10	6	1	12
8			
86			
3			
259			
20			

Grains in a Pound.

5760)5192.000000(901388 Answer.
5184 0
.8 000
5 760
.* 2400
1 7280
.51200
46080
.54800
46080
5120

Or thus.

2|0(10.00
9)1.600
8)6.533333
12)10.816666
.901388 Anf. the same as before.

Avoirdupoise

AVOIRDUPOISE WEIGHT.

What's the Decimal of 16*C*. 2*qr*. 20*lb*. 12*oz*. 10*dr*. a Ton being the Integer.

C.	*qr*.	*lb*.	*oz*.	*dr*.
16	2	20	12	10

```
   4
  ---
  66
  28
 ----
 528
134
 ----
1868
  16
 -----
29900
  16
 -----
```

Drams in a Ton.

```
573440)478410·0000000(.8342808 Answer.
       4587520
       -------
        1965800
        1720320
        -------
         2454800
         2293760
         -------
          1610400
          1146880
          -------
          4635200
          4587520
          -------
            4768000
            4587520
            -------
             180480
```

See the short way.

```
4)10.00
  -----
4)2.50
  -----
4)12.625
  -------
4)315625
  -------
7)20.7890625
  ---------
4)29698660
  ---------
4)2.7424665
  ---------
2|0)16.685616|6
  ---------
   .8342808 Answer.
```

Note;

Note. In this Example I have divided by the parts contained in each Denomination, as in Drams I have divided by 4 and 4, for 4 x 4=16 the Drams in 1 Ounce, and in Ounces by the ſame, for 4 x 4=16 the Ounce in 1 Pound, and in Pounds by 7 and 4, for 4 x 7=28 the Pounds in a Quarter of a Hundred, and ſo of the reſt, as in Quarters I have divided by 4, the Quarters in a Hundred, and in Hundreds by 20 the Hundreds in a Ton, in like manner may any other Example be wrought, whoſe Diviſor is the Product of two ſmall numbers.

WINE MEASURE.

What's the Decimal of 1*P.* 1*H.* 50*G.* 1*P.* 1*Q.* 1*P.* a Tun being the Integer.

The given Quantity reduced into Pints are 1919, which divided by 2016 the Pints in a Tun, the Quotient is .951884 the Decimal ſought.

ALE MEASURE.

Note. In the Country the Ale, Beer, ſtrong and ſmall, are all one, *(viz.)* 34 Gallons to the Barrel, and 282 Cubic Inches to the Gallon.

What's the Decimal of 29*G.* 3*Q.* 1*P.* a Barrel being the Integer.

G.	*Qt.*	*P.*
29	3	1
4		
119		
2		

The Pints in a Barrel are } 256)239.000000(.933593 Anſwer.

DRY MEASURE.

What's the Decimal of 0*W.* 4*Q.* 1*C.* 1*B.* 3*P.* 0*G.* 2*P.* a Laſt being the Integer.

Theſe reduced into Pints are 2418, which divided by 5120 the Pints in a Laſt, the Quotient is .472265, the Decimal ſought.

Land

LAND MEASURE.

What's the Decimal of 1*R.* 10*P.* an Acre the Integer.

R. *P.*
1 10

40

160)50.0000(.3125 Anſwer.
480
.200
160
.400
320
.800
800
0

Or thus.

4|0)10.000

4)1|.2500

.3125 Anſ. the ſame as before

LONG MEASURE.

What's the Decimal of 0*F.* 27*P.* 4*Y.* 2*F.* 10*I.* a Mile being the Integer.

Theſe reduced into Barley Corns are 16572, which divided by 190080 the Barley Corns in a Mile, gives in the Quotient .08718434, the Decimal ſought.

YARD MEASURE.

What's the Decimal of 3*qr.* 1*nl.* a Yard the Integer.

qr. *nl.*
3 1

4

16)13.0000(.8125 Anſwer.
128
.20
16
.40
32
.80
80
0

Or thus.

4)1.00

4)3.25

.8125 Anſ. ſame as before.

Time

TIME.

What's the Decimal of 271*d.* 19*h.* 15'. 50". a Year being the Integer.

Theſe reduced into Seconds are 23483750, which divided by 31557600, the Seconds in a Year, gives the Quotient .74415513, the Decimal ſought.

MOTION.

Whats the Decimal of 23°. 19', 56". a Circle being the Integer.

```
                 °   '   "
                23  19  56
                60
               ----
               1399
Sec. in a Circle 60
-----------------
1296000)83996.000000(.064811  Anſwer.
        77760 00. ...
        -----
        .6236000
         5184000
         -------
         10520000
         10368000
         --------
           .1520000
            1296000
            -------
            .2240000
             1296000
             -------
             .944000
```

Or thus.

```
6|0)56.000
-----------
6|0)19.9333
-----------
3|0)23.33222
-----------
12)777740
---------
.064811 Anſ.
```

FOOT MEASURE.

12 Parts make one Inch, 12 Inches make 1 Foot.

What's the Decimal of ¼ of an Inch a Foot the Integer.

```
4)1.00000
---------
12).25000
---------
.020833 Anſ.
```

What's the Decimal of 3 Inches, a Foot the Integer.

```
12)3.0
------
.25 Anſ.
```

What's the Decimal of 3¼ Inches, a Foot the Integer.

```
12)3.25
-------
.2708333 Anſwer.
```

By the above Method, you may calculate a Table of the Decimal parts of a Foot.

To

To find the value of a *Decimal Fraction*, in the known parts of *Money*, *Weights*, *Measures*, *Time*, &c.

RULE.

Multiply the given Decimal by the Denominative parts of the thing of which it is a Fraction, and cut of towards the right hand of the Product, so many places as the given Decimal contains, and those on the left hand are the value of the given Decimal; and if any thing remains, it is the decimal of an Integer in the Denomination last found, which must be brought to the lowest name mentioned. A few Examples will make the thing plain to the meanest capacity.

What's the value of this Decimal .0125 of a Pound Sterling.

	.0125
	20
	.2500
	12
Anf. 3*d.*	3.0000

What's the value of this Decimal .0375 of a Pound Sterling.

	.0375
	20
	.7500
	12
Anf. Pence,	9.00

As often as Cyphers fall on the right hand your work, always drop them, for they have no manner of signification.

What's the value of this Decimal .95 of a Pound Sterling.

	.95
	20
	19.00
Anf. 19*s.*	

What's the value of .528125 of a Pound Sterling.

	.528125
	20
	10.562500
	12
	6.75
	4
	3.00

Anf. 10*s.* 6*d.* ¾.

Question

Queſtion by Mr. *Tho. Sadler*, ſee his *Arithmetic*, Page 299.

Now *Tyro* advance learn the Decimal art,
In ſurveying Eſtates you'll then ſoon take a part;
Come tell me the parts in the margin * ſubjoin'd, *.8375
Of an Acre of Land roods and poles, both combin'd,
Come do the thing clearly, no doubt very ſoon,
You'll be a Surveyor, and meaſure the Moon.

.8375
4
3.3500
40
14.00 Anſwer. 3*Rds.* 14*Pls.*

What is the value of .8146 Hogſhead.

.8146
63
24438
48876
Anſ. 51.3198 *Gall.*

What is the value of .775 Ounce, Troy.

.775
20
15.500
24
12 0 Anſ. 15*dwt.* 12*gr.*

To find the value of any Decimal by inſpection, a Pound Sterling being the Integer.

R U L E.

Double the figure in the firſt place of the given Decimal, for Shillings, and if the figure in the ſecond place be 5 or more, then add 1 to the double of the firſt figure, and the ſecond figure if under 5, or the exceſs if above 5 prefix to the third figure, and reckon them as Farthings, abating 1 when they are above 25, and 2 when above 40.

What's the value of this Decimal .95, of a Pound Sterling.

.95, ——— 19*s.* Anſwer.

In this Example I double the firſt figure, and add 1 to it, (becauſe the ſecond is 5,) and it makes 19*s.* the Anſwer. ſee the foregoing Page.

What's

What's the value of this Decimal .0375 of a Pound Sterling. .0375——9*d*. Anſwer.

Note. In this Example as the firſt figure is 0, I take the 37, and as it is more than 25, I abate 1, calling it 36 Farthings=9*d*. the Anſwer. See Page 322.

What's the value of this Decimal .528125 of a Pound Sterling.

.528125——10*s*. 6*d*. ¼, Anſwer.

In this Example I double the firſt figure for Shillings, (and as the ſecond is leſs than 5, I dont add) and it makes 10*s*. then 28 is more than 25, therefore I abate 1, calling it 27 farthings=6*d* ¾, ſo the Anſ. is 10*s* 6*d* ¼, ſee Page 322

Queſtion for exerciſe, by *T. Sadler*, ſee his *Arithmetic*. Page 300.

In the 2*d*. Book of *Samuel*, chap. 14. we read that *Abſalom* cut off the hair of his head every Year, and that it weighed 200 half ounce Shekels. What was the weight in pounds, and Decimal parts of a Pound.

200 ½ ounce Shekels=100 ounces

4)100

4)25

6.25=6*lb*. ¼ Anſ.

Various are the opinions of the learned, with regard to the weight of the Shekel, which muſt be known, (Mr. *Sadler* calls it the half ounce Shekel, then 200 half ounce Shekels=100 ounces as in the above Example,) but the learned *M^r le Pelliter* of *Rohan*, ſeems to put the matter beyond diſpute, and ſolidly proved that it was nine Penny-weights and three Grains: but the Shekel of Gold. which is generally ſuppoſed to be that meant by the King's weight, was only half the former, namely, four Penny-weights thirteen Grains and a half; according to this computation the weight of *Abſalom*'s hair, which was 200 Shekels after the King's weight, amounts to 45 ounces 12 grains and a half, which is far ſhort of *Sadler*'s weight, but as I cannot aver neither this, nor the above calculation to be the truth, I ſhall leave it to the opinions of thoſe who are more capable of expounding it than I.

Addition

Addition of *Decimal Fractions.*

ADDITION of DECIMALS is the ſame in operation as whole numbers, ſave in this, that the Decimal places muſt be prick'd off in the Product, juſt as many as three are number of places in the greateſt Decimal given, and the total will be the ſame in value, as if they were whole numbers, or Vulgar Fractions, as follows.

By Decimals.	*By Vulgar Fractions.*	*By whole Numbers.*
£.	£.	£.
24.25	24 $\frac{1}{4}$	24.05
36.75	36 $\frac{3}{4}$	36.15
42.5	42 $\frac{1}{2}$	42.10
£. 103.50	£. 103 $\frac{1}{2}$	£. 103.10 Anſ.

So you ſee the Totals of all are equal.

Subtraction of *Decimal Fractions.*

SUBTRACTION of DECIMALS is the ſame in operation as whole numbers, for you muſt ſubtract them as whole numbers; and from their difference prick of as many for Decimals as there are in the greateſt number given.

	Fractions.	*Mix'd Numbers.*
From	.4867	1.4165
Take	.3674	.346
Remains	.1193	1.0705
Proof	.4867	1.4165

	£.		£.	s.	d.
Lent	1720 . 027	are	1730	0	6 $\frac{1}{2}$
Paid again	1681 . 835	equal to	1681	16	8 $\frac{1}{2}$
Unpaid	48 . 192		48	3	10
Proof	1720 . 027		1730	0	6 $\frac{1}{2}$

Multiplication of *Decimal Fractions.*

MULTIPLICATION of DECIMALS is the very ſame as that of whole numbers in all reſpects, whether both the Factors

be Decimal Fractions, or whether they be mix'd numbers, only when the work is done, all the matter is to diſtinguiſh the true Product, which is always known by cutting off to the right hand of the Product ſo many places, as you have Decimal places in both the Multiplicand and Multiplier, but if the Product doth not produce ſo many places, the defect muſt be ſupplied by prefixing ſo many Cyphers on the left hand the Product, as will make the places equal to thoſe in both Factors.

CASE I

A Decimal Fraction multiplied by a Decimal Fraction.

Multiplicand .864
Multiplier .432
1728
2592
3456
.373248

CASE II.

A Decimal Fraction multiply'd by a mix'd number.

Multiply .864
by 4.32
1728
2592
3456
3.73248

CASE III.

A Decimal Fraction multiply'd by a whole number.

Multiply .864
by 432.
1728
2592
3456
373.248

☞ Tho' I have made uſe of the ſame figures throughout each of theſe three Examples, yet the Reader will find the value of the Products to be very different.

I might have ſaid ſomething concerning contraction of Multiplication of Decimals, but would have been ſwelling the Treatiſe to no manner of purpoſe but curioſity only. See *Birks's Arithmetic*, Page 193, where that Author ſays, they are more curious than uſeful.

Diviſion

Division of *Decimal Fractions.*

DIVISION of DECIMALS or mix'd numbers are performed the very same as whole numbers, all the difficulty is to know the Denomination of places in the Quotient, and they are easily discovered by this one

General RULE.

Take notice how many Decimal places you have in the Divisor, and how many in the Dividend, and as many as the difference is, so many must be prick'd off in the Quotient, beginning to count at the right hand, but if so many places are not in the Quotient as the difference is, make up the number by annexing Cyphers to the left hand, but if there be not so many places of parts in the Dividend as in the Divisor, make the number equal by annexing Cyphers to the right of the Dividend, then will the Quotient be a whole number.

This and all other General Rules ought to be got perfectly by heart.

Divide 18.253125 by 2.475

2.475)18.253125(7.375 Answer.

17 325

.9281

7425

18562

17325

.12375

12375

0

In this Example are 3 Decimal places in the Divisor, and 6 in the Dividend, the difference is 3, so you must prick off 3 places in the Quotient for Decimals.

Divide 7.25406 by 957.

957)7.25406(.00758 Answer.

6 699

• 5550

4785

.7656

7656

0

In this Example there is 5 places of Decimals in the Dividend, and none in the Divisor, so there must be 5 Decimal places in the Quotient, & there are but 3 when the Division is ended; so I annex 2 Cyphers to the left hand of the Quotient, and the Answer is as above.

Divide 55.37376 by 4.176

4.176)55.37376(13.26 Anſwer.
41 76
13613
12528
10857
8352
25056
25056
0

In this Example the number of Decimal places in the Dividend, exceeds thoſe in the Diviſor by 2, therefore that number of Decimals is pointed off in the Quotient.

The *Rule* of *Three* in *Decimals*.

The method of working the RULE of *Three* in *Decimals*, is the ſame as in whole numbers, ſave in this, that in whole numbers the numbers given are reduced to the loweſt name mentioned; but in Decimals the inferior numbers are brought into the higheſt name mentioned, and ſometimes higher than the middle numbers are brought in, and as in whole numbers, if the firſt and third numbers be not of one name or Denomination, they muſt be made ſo, and work as in whole numbers.

If 3 ounces of Silver coſt 17*s.* what coſt 48 ounces.

oz. l. oz.
If 3—85——48
48
680
340
3)4080
13.60

20)17.
.85

Obſerve the middle number is brought into a higher name than was mentioned.

Anſ. 13*l.* 12*s.* ſee the third Example in the Single RULE of THREE of whole *No.*

If 3*lb.* of Ginger coſt 3*s.* what coſt 26*lb.*

lb. l. lb.
If 3—15 26
15
3)390
1.30

20.3.
.15

Anſ. 11. 6*s* ſee the 4*th.* Example in the Single RULE of THREE of whole numbers.

If 26*lb.* of Ginger coſt 1*l* 6*s.* what coſt 3*lb.*

If 26—1.30—3
3
26)3.90(15
26
130
130
0

Anſ. 3*s.* and is Proof of the laſt Example.

Extraction of the *Square Root.*

EXTRACTING of the SQUARE ROOT is to find out ſuch a number as being multiplied into itſelf, the Product will be equal to the given number.

As the Square Root of 81 is 9, conſequently $9 \times 9 = 81$, the given number.

Roots.	1	2	3	4	5	6	7	8	9
Squares.	1	4	9	16	25	36	49	64	81

RULE. Point the given number or Reſolvend into Periods of each two figures, beginning at the units place; then find by the Table the greateſt ſquare number that is Contained in the firſt Period towards the left hand, placing the ſquare number under the firſt Period, and the Root in the Quotient (as in Diviſion) ſubtract that ſquare out of the ſaid Period, and to the remainder bring down the next Period for a Dividend, then double the Quotient or Root, and place it for a Diviſor, ſeek how often the Diviſor is contained in the Dividend (reſerving always the units place) and put the Anſwer in the Quotient, and alſo on the right hand of the Diviſor; then multiply the Diviſor by the laſt figure put in the Quotient (as in common Diviſion) the Product ſubtract from the Dividend, and to the remainder bring down the next Period, which proceed with as before.

But if it happens that the given reſolvend is not a perfect Square, Cube, *&c.* then ſomething will remain after Extraction hath been made throughout all the Points; when this is the caſe, you muſt annex Cyphers according as the propoſed power requires, *(viz.)* by pairs or two's in the Square, threes in the Cube, *&c.* and the operations continued as before.

If the given Reſolvend conſiſts of a whole number and Decimals together, make the number of Decimals even by adding Cyphers to them.

What's

What's the ſquare Root of 76176.

```
. . .
76176(276 Root.
4
47)361
329
546)3276
3276
0
```

To prove the ſquare Root is only to multiply the Root by itſelf as in this Example the Root is

```
276
276
1656
1932
552
76176 the Proof.
```

Explanation. The number being ſeparated or pointed into Periods of 2 figures each, then the neareſt ſquare number to 7 the firſt period is 4, which is ſet under and ſubtracted therefrom, and 2 the ſquare of Root of 4 is placed in the Quotient. and to the remainder 3 the next period 61 is brought down or annexed, which makes 361 for a new Dividend or reſolvend, to the left hand whereof is placed 4, *(viz.)* the Quotient doubled or multiplied by 2, and as 36 (part of the Reſolvend) contains the 4 (part of the Diviſor) with what will be carried to the Product, 7 times 7 is ſet in the Quotient and to the right hand of the Diviſor alſo; making it 47, which being multipled by 7 the product 329 is ſet under and ſubtracted from 361 the new Reſolvend, and to 32 the remainder, 76 the 3*d.* and laſt period is annexed, making 3276 for another new reſolvend, to the left of which is placed 54 the double of the Quotient 27, then as 54 is contained in 327 (part of the new reſolvend) 6 times 6 is placed in the Quotient and likewiſe to the right of the Diviſor, making it 546 which being multiplied by the quotient figure 6, the product 3276 is ſet under the reſolvend, and as nothing remains, the work is finiſhed, and 76176 found to be a ſquare number, and 276 its Root.

Obſerve that every Root muſt conſiſt of as many places of figures as there are periods in the given number, and will be Integers or Decimals reſpectively as the periods are ſo, from which they are found, or to which they correſpond.

Let

```
     . . .                          555
    308025(555 Root Anſ.            555
    25                             ----
105).580                           2775
     525                          2775
1105).5525                       2775
      5525                       ------
         0                       308025  Proof.
```

Let it be required to extract the ſquare Root of 5467.184,

```
     . . . .
     5467.1840(73.9404084  &c.
     49
143).567
     429
1469)13818
     13221
14784).59740
       59136
1478804).6040000
         5915216
147880808).1247840000
           1183046464
1478808164).6479353600
            5915232656
            .564120944
```

In the given number of this Example there being but 3 Decimals a cypher was annexed to make them an even number, in order that they may be divided into periods, as before, and when any number to be extracted is (like this) not a ſquare but irrational periods of cyphers may be added at pleaſure, and the further you proceed, the more exact will be the Root, but for common purpoſes 4 places of Decimals is enough.

The ſquare root of a Vulgar Fraction that is commenſurable to its root, may eaſily be found by extracting the ſquare root of the numerator for the numerator of the root, and likewiſe the ſquare root of the Denominator for the Denominator of the ſaid root, which Fraction is the root ſought, as if the ſquare root of $\frac{9}{49}$ were required it would be found to be $\frac{3}{7}$, for the ſquare root of 9 is 3, of of 49 is 7, equal to $\frac{3}{7}$, and ſo of any other.

Note. If the Fraction propounded, be not in its loweſt Terms, reduce it into its loweſt Terms, and then by the

Rule foregoing, extract the ſquare root of the Numerator, and alſo of the Denominator, ſo ſhall this new Fraction be the ſquare root of the Fraction propounded.

But if the Fraction be not a complete power (but an imperfect one, or ſurd) reduce it to a Decimal, and then extract the ſquare root from it

Note. The Decimal Fraction muſt conſiſt of an even number of places, as two, four, *&c.*

The Uſe of the *SQUARE ROOT.*

There is an Army conſiſting of a certain number of men, who being plac'd rank and file, that is, in the form of a ſquare, each ſide having 472 men; I demand how many men the whole ſquare contains.

472 } *No.* of
472 } Men.
944
3304
1888
Anſ. 222784 Men.

Suppoſe 222784 Soldiers are to be put in rank and file, in the form of an equal ſquare; I demand how many Soldiers will be in the front, and how many deep.

222784(472 Anſ and Proof of the other Example.
16
87).627
609
942).1884
1884
0

The wall of a Town is 17 feet high, which is ſurrounded by a Mote of 20 feet in breadth; I demand the length of a ladder which ſhall reach from the outſide of the Mote to the top of the wall.

First 17 Then 20
□ 17 □ 20
289 Add { 400 / 289
√689(26.2+ Feet Anſwer.
4
46)289
276
522)1300
1044
256

Queſtion by Mr. *T. Sadler*, ſee his *Arithmetic*, Page 313.

A ſet of true BRITONS all jovial and free,
Were drinking full bumpers to dear Liberty,
Till the reckoning came to the ſum * here ſubjoin'd,
The number of Perſons, haſte *Tyro* and find,
Whoſe ſhare muſt be equal, come tell unto me,
No doubt but *Mæcenas* will ſmile upon thee.

* *l. os. od.* $\frac{1}{4}$.

l. s. d. Farthings.	*Men. Far. Man.*
First 1 0 0 $\frac{1}{4}$ = 961 (31 Men	Then if 31—961—1
9	4)
61)61	31)961)31
61	93 7 $\frac{3}{4}$ each man's
0	.31 share.
	31
	0

Extraction of the *Cube Root.*

TO Extract the Cube Root is to find out a number, which being multiplied into itſelf, and then again into the Product, produceth the given number.

As the Cube Root of 729 is 9, conſequently 9 x 9 x 9 = 729 the given number, and ſo of others as in the following

TABLE.

Roots.	1	2	3	4	5	6	7	8	9
ſquares	1	4	9	16	25	36	49	64	81
Cubes.	1	8	27	64	125	216	343	512	729

Point out the given Cube number, beginning with the units place, and ſo over every third figure towards the left hand; and as many points or periods as there are, ſo many figures there will be in the Root.

RULE.

The Cube of your firſt Period take,
And of its Root a Quotient make,

Which Root into a Cube muſt grow,
And from your period taken fro' :
To the Remainder, then you muſt,
Bring down another Period juſt ;
Which being done, then you muſt ſee,
Your numbers ſtraight divided be,
By juſt three hundred times the ſquare,
Of what your Quotient figures bear ;
Which do ſo that you in may take,
The fact your Quotient figures make,
Laſt, ſquar'd and multiply'd by th' reſt,
And Product thirty times expreſt :
The Cube of your laſt found figure too,
You muſt put in, if right you do;
Repeat your work, and ſo deſcend,
From point to point unto the end :
That done, if ought remain, you ſhall
Add trebled cyphers for a Decimal.

Let it be required to extract the Cube root of 46656.

46656(36	36
27	36
2700)19656. Dividend.	216
16200	108
3240 Subducends added.	1296
216	36
Sum 19656 from dividend ſubtract.	7776
....0 Remains.	3888
	46656 Proof.

EXPLANATION of this Example.

I. Point your number as before directed, whereby you may ſee the root will have but two places.

II. Seek the greateſt root of your firſt period 46, which by the foregoing Table you will find to be 3: which place in your Quotient, and the Cube thereof 27 place under 46, ſubtract 27 from 46, and 19 remains, as you ſee in the work ; this is your firſt work and no more to be repeated.

III.

III. To your remainder 19, bring down your next and laſt period 656, and it will make 19656 for a Dividend; then ſquare your Quotient, 3 makes 9, which multiply by 300, produceth 2700 for a Diviſor. Seek how oft 2 in 19, ſay 6 times, becauſe of the increaſe that will come from the Quotient, then I multiply my Diviſor by 6, and the Product 16200 I place under my Dividend, having ſeparated them with a ſmall line; then proceed to find the increaſe coming from the Quotient; thus ſquare your laſt figure 6 makes 36, which multiply by the reſt of your Quotient here by 3 makes 108, and this by 30, makes 3240, which place under my laſt number 16200: then cube the figure laſt placed in your Quotient here 6, and it makes 216, which place under your laſt number 3240, then add your three ſubducends (for ſo many you have in every operation after the firſt) into one ſum, which make 19656; and ſeeing it is equal to my dividend, and no more periods to bring down, the work is finiſhed, and the number a right Cube number, and the root is 36.

* To prove the Cube root is only thrice involving the root into itſelf, *(viz.)* multiplying the root by itſelf, and that Product or ſquare by the ſame root again, thus the Cube of 36 is $36 \times 36 \times 36 = 46656$ the given reſolvend in this Example.

* *Note.* As many operations or periods as you have, except the firſt, ſo oft this laſt work is to be repeated.

1st Divisor which is 300 times the □ of 8 in root.	. . . . . 673373097125(8765 Root sought. 512 the Cube of 8 in the root. 19200)161373 1st dividend & 373 brought down. 134400 Divisor x by 7 in the Root. 2d divisor which is 300 times the □ of 87 in root. 11760 □ of 7 x by 8 and that by 30. 343 Cube of 7 in the root. 146503 Subducends added. (down. 2270700)14870097 2d dividend & 097 brought 13624200 Divisor x by 6 in the Root. 3d divisor which is 300 times the □ of 876 in Root. 93960 □ of 6 x 87 & that by 30, 216 Cube of 6 in the Root. 13718376 Subducends addded. (down. 230212800)1151721125 3d dividend & 125 brought 115106400 Divisor x 5 in the root. 657000 □ of 5 x 876 & by 30. 125 Cube of 5 in the Root. 1151721125 Subducends added. .....0 Remains.

But if your number to be extracted, have a remainder, it is then an irrational number, and the exact root cannot by art be discovered, tho' you may find it near enough for practice; if to the remainder in every operation you add 3 cyphers, and so work as far as you will.

To extract the Cube root of a *Vulgar Fraction*, observe the directions given for extracting the square root thereof, only use the Cube root instead of the square root.

The use of the CUBE ROOT.

To find two mean Proportionals between two extremes, 5 and 135.

	Proof.
5)135	
27 whose Cube root is 3	If 5—15—45
5 the less extreme.	15
15 less mean.	5)675
3	135
45 greater mean.	

In

In the laſt Example the greater extreme is divided by the leſs, and the Cube root of that Quotient multiply'd by the leſs extreme, gives the leſs mean, which multiply'd by the ſaid Cube root gives the greater mean, as before.

If a cubical piece of timber be 41 inches long, 41 inches broad, and 41 inches deep; how many cubical inches doth it contain.

41
41

41
164

1681
41

1681
6724

68921 Anſ.

Suppoſe the ſide of a Cube be 9.5 inches, what muſt be the ſide of a Cube containing three times the Solidity.

9.5
9.5

475
855

90.25
9.5

45125
81225

857.375
3

. . .
2572.125(13.5
1
---
300)1572
900
270
27

1197
50700)375125
253500
9750
125

263375

111750 Remains.

Here it is plain that the ſide of the cube ſought is 13.5 Inches.

Of

Of *DUODECIMALS.*

DUODECIMALS are Fractions of a Foot, or of an Inch, or any part of an Inch, having 12 for their Denominators.

NOTATION of DUODECIMALS.

Duodecimals are wrote thus $3^{F}.\ 7^{I}.\ 2^{II}\ 3^{III}\ 7^{IV}$ &c and read thus 3 feet 7 inches 2 seconds 3 thirds 7 fourths &c.

Though the manner of dividing and subdividing a Foot is endless, yet it is so only in imagination, and cannot be reduced to Practice, because a second or twelfth part of an Inch is so small, as to be incapable of any farther division.

Addition *of* Duodecimals.

Note, 12 Fourths, 12 Thirds, 12 Seconds, 12 Inches make 1 Third, 1 Second, 1 Inch, 1 Foot.

F.	I.	II	III	IIII
14	4	3	5	6
17	10	11	10	4
16	8	4	6	7
13	6	1	4	8
19	11	4	6	3
14	10	3	2	1
48	4	3	0	6
19	2	7	6	2
164	10	3	6	1

Subtraction *of* Duodecimals.

	F.	I.	II	III	IIII
From	78	3	4	7	8
Take	67	4	3	6	9
Remains	10	11	1	0	11
Proof	78	3	4	7	8

A Joiner having lined several Rooms very curiously with Cedar, finds the amount to be in square measure, 816*F.* 3*I.* 4″, but several deductions being to be made for Windows, Arches, &c. those deductions amounted to 68*F.* 3*I.* 7″ 11‴ 6⁗, how many Feet of Workmanship must he be paid for.

	F.	*I.*	″	‴	⁗
Amount	816	3	4	0	0
Deductions	68	3	7	11	6
Answer	747	11	8	0	6
Proof	816	3	4	0	0

Multiplication *of* Duodecimals. *commonly called* Cross Multiplication.

Note, Feet, Feet, Feet, Inches, Inches, Seconds } Multiply'd by { Feet give Feet, Inches give Inches, Seconds give Seconds, Inches give Seconds, Seconds give Thirds, Seconds give Fourths.

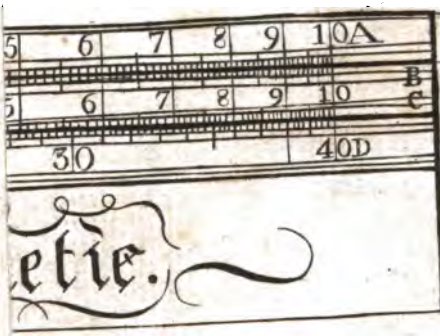
Multiply 7 3
by 4 7
29 0″
4 2 9
Product 33 2 9

In this Example I multiply the 7*F.* 3*I.* first by 4 Feet (which gives Feet and Inches for the Product) saying, 4 times 3 is 12, set down 0, and carry 1; then 4 times 7 is 28 and 1 is 29, which set down.

Next I multiply the same 7*F.* 3*I.* by 7 Inches, (which gives Inches and Seconds for the Product) saying 7 times 3 is 21, set down 9 Seconds and carry 1 Inch; then 7 times 7 is 49 and 1 is 50 Inches, or 4 Feet 2 Inches, which set down; then add them together, and the whole is 33*F.* 2 *I.* 9″.

	F.	*I.*		*F.*	*I.*		*F*	*I.*
Multiply	4	6	Multiply	9	7	Multiply	3	8
by	5	8	by	9	7	by	7	6
	22	6		86	3	″	25	8
	3	0		5	7	1	1	10
Product	25	6	Product	91	10	1	Product 27	6

The truth of any one of the laſt operations, may be found by reducing the Factors into Inches, and dividing their Product by 144 the number of ſquare inches in a ſquare Foot, the Quotient will [illegible]



duct 3733 5 3

Of Feet, Inches, and Seconds.

	F.	I.	"			F.	I.	"		
Multiply	7	5	2			8	6	9		
by	1	7	3			7	3	8		
	7	3	2	m		59	11	3	m	
	4	2	10	2	mm	2	1	8	3	mi
		1	9	9	6		5	8	6	0
Product	11	7	9	11	6	62	6	7	9	0

Division *of* Duodecimals.

F.	I.	"	
2)146	7	10	
73	3	11	
3)761	4	11	
253	9	7	8.

F.	I.	"	F.	I.	"	m	m	F.	I.	"
1 7 3)11	7	9	11	6(7	3	2				
	11	2	9							
		5	0	11						
		4	9	9						
			3	2	6					
			3	2	6					
					0					

See the first Example work'd the long way

2)146 7 10(73·311 Anſ.

14

6

6

7

6

22

22

0

Of the *SLIDING RULE.*

Notation on the SLIDING RULE.

THE Lines of numbers upon the *Sliding Rule*, are laid down from the Logarithms, and are compoſed of a ſingle or double Radius, and the ſeveral lines are marked at the end with *A*, *B*, *C*, *D*, for diſtinction ſake, each Radius is divided into nine equal parts in a Geometrical proportion, and figured 1, 2, 3, 4, 5, 6, 7, 8, 9, called Primes, whoſe ſignification are Arbitrary.

Theſe

Theſe diviſions are again divided (when the firſt diviſions are large) into ten equal parts, now the firſt figure at the beginning of the Rule to the left hand, may repreſent either .1, 1, 10, 100, 1000.

And the ſame figure in the middle of the Rule, if a double Radius, may repreſent 1, 10, 100, 1000. 10000, encreaſing in a tenfold proportion; and the like may be ſaid of the intermediate diviſions.

The method of Numeration upon the *Sliding Rule* may be conceived by this ſingle conſideration, *(viz.)* that what name or Denomination ſoever the 1 at the beginning of the line is of; the 1 in the middle of the line will repreſent ten times as many; and the 1 at the end of the line will repreſent an hundred times as many.

Let it be required to find any number on the line *A*, as ſuppoſe 2.15042. obſerve then that if 1 at the beginning being accounted as unity, the 2 will be 2, and the firſt grand diviſion will be 1, and the ſmall diviſion will be 50, ſo that the 42 muſt be gueſſed at, it being but a very little more than the centeſms.

Let it be required for 21.5042. This will fall on the ſame point, for taking the firſt figure for 10, the 2 will be 20, amd the intermediate diviſions will encreaſe in a ten fold proportion *(viz)* the tenths to units, and the centeſms to tenths, *&c.*

Let it be required for 2150.42 to be found on the *Rule*. The firſt figure muſt be taken for 1000, then will the 2 be 2000, and the firſt grand diviſion after the 2 will be 100, the ſmall diviſion 50, and the 42 muſt be gueſſed at, ſo that 2.15042, 21.5042, 2150.42 will all fall on one point, ſee *Leadbetter's* deſcription of the *Sliding Rule*.

In like manner may any other number be found, I ſhall now proceed to ſhew how to perform *Multiplication* on the *Sliding Rule*. Multiplication

I hope no perſon will be offended at my familiar explanation of the lines of numbers, for that is intended only for the uſe of thoſe who are wholly unacquainted with it: as the Book may drop into perſons hands that have no knowledge of the Sliding Rule, *this explanation is inſerted for their inſtruction.*

Multiplication on the *Sliding Rule.*

Logarithms perform that by *Addition* and *Subtraction*, which common numbers do by *Multiplication* and *Diviſion*; and the *Sliding Rule* at one ſetting gives a multitude of Products at one view.

RULE. Set unity or 1, on either of the lines *A*, or *B*, to either Factor on the line of numbers, on either *A*, or *B*, and againſt the other Factor on the ſame line you had unity is the Product on that line you had the firſt Factor.

The proportion is as unity is to the Multiplier, ſo is the Multiplicand to the Product.

Example 1ſt. Let the Product of 6 by 7 be ſought.

Set 1 upon *B*, to 6 upon *A*, and againſt 7 upon *B*, is 42 upon *A*, the Anſwer.

Example 2d. Let the product of 8 by 9 be ſought.

Set 1 upon *B*, to 8 upon *A*, and againſt 9 upon *B*, is 72 upon *A*, the Anſwer. Or ſet 1 upon *A*, to 8 upon *B*, and againſt 9 upon *A* is 72 upon *B*, the Anſ. as before.

Example 3d. Let the Product of 5 by 10 be ſought.

Set 1 upon *B*, to 5 upon *A*, and againſt 10 upon *B*, is 50 upon *A*, the Anſwer.

To prove the laſt example by *Gunter's* line of numbers, extend your Compaſſes from 1 to 10, the ſame extent will reach from 5 to 50 the Anſwer.

Example 4th. Let the Product of 5 by 7 be ſought.

Set 1 upon *B*, to 5 upon *A*, and againſt 7 upon *B*, is 35 upon *A*, the Anſwer.

By *Gunter*. Extend your Compaſſes from 1 to 7, the ſame extent will reach from 5 to 35, the Anſwer.

Let the Product of 7.3 by 20.2 be ſought. Set 1 upon *B*, to 7.3 upon *A*, and againſt 20.2 upon *B*, is 147.5 upon *A*, the Anſwer.

$$\begin{array}{r} 7.3 \\ 20.2 \\ \hline 146 \\ 1460 \\ \hline 147.46 \end{array}$$ Proof.

Let

Let the Product of 2.7 by 6.8 be ſought. Set 1 upon *B*, to 2.7 on *A*, and againſt 6.8 on *B*, is 18.4 on *A*, the Anſwer.

By *Gunter*. Extend your Compaſſes from 1 to 6.8 the ſame extent will reach from 2.7 to 18.4 the Anſwer.

Diviſion on the *Sliding Rule*.

Multiplication and *Diviſion* are a Proof of each other, and the *Sliding Rule* is an excellent proof of any thing that is done in practical Mathematics by numbers, for if the Product of any Multiplication be divided by either Factor, the Quotient will be the other Factor.

Rule, Set unity or 1, on either of the lines *A*, or *B*, (it matters not which) to the Diviſor on the other lines, and againſt the Dividend on the ſame line you had the Diviſor, you will have the Quotient on the ſame line you had unity: or, as unity is to the Diviſor, ſo is the Dividend to the Quotient.

Let the Quotient of 42 divided by 6 be ſought, ſee the firſt Example in Multiplication.

Set 1 upon *B*, to 6 the Diviſor upon *A*, and againſt 42 the Dividend upon *A*, is 7 the Quotient upon *B*.

Or, ſet 1 upon *A*, to 6 upon *B*, and againſt 42 upon *B*, is 7 upon *A*, the Anſwer required.

Let the Quotient of 72 divided by 9 be ſought, ſee the ſecond Example in Multiplication.

Set 1 upon *B*, to 9 upon *A*, and againſt 72 upon *A*, is 8 the Quotient upon *B*.

Let the Quotient of 50 divided by 10 be ſought, ſee the third Example in Multiplication.

Set 1 upon *B*, to 10 upon *A*, and againſt 50 on *A*, is 5 the Quotient on *B*.

Let the Quotient of 88 divided by 8 be ſought.

Set 1 upon *B*, to 8 upon *A*, and againſt 88 upon *A*, is 11 the Quotient upon *B*.

Let the Quotient of 18.4 divided by 2.7 be ſought, ſee the laſt Example in Multiplication.

Set 1 upon *B*, to 2.7 upon *A*, and againſt 18.4 upon *A*, is 6.8 upon *B*, the Anſwer. The